ROAD AND BRIDGE DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS

ADOPTED BY RESOLUTION #2005-40

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27.0: GENERAL STANDARDS

27.0.1: Purpose and Intent

The Archuleta County Road and Bridge Standards and Construction Specifications establish uniform road design and construction policies throughout Archuleta County and provide a clear statement of the procedures for road, bridge and recreational pathway construction. The purpose and intent of these policies and procedures is to provide safe attractive travel corridors, efficient traffic flow and efficient maintenance.

27.0.2: Authority

The State of Colorado, by statute, authorizes the County to administer the County road system including, but not limited to, maintenance, design standards, alterations, deletions, additions, construction specifications, property acquisition and traffic regulation. The Engineering Department reviews plans for compliance with design standards, ensures compliance with road construction specifications, and conducts inspections. The Road & Bridge Department maintains and improves roads accepted by Archuleta County, administers work within public rights-of-way, reviews plans, and conducts inspections.

27.0.3: Types of Roads

The Archuleta County Land Use Regulations require certain offers of dedication of rights-of-way and the County accepts these dedications on the public's behalf. However, the offer of dedication of rights-of-way over privately owned lands or subdivision roads does not constitute acceptance of road maintenance obligations. The roads contained in the countywide circulation system can be classified based on the ownership of the road right-of-way and who has responsibility for maintenance. These categories are described below.

27.0.3: Road Numbering & Naming

All public and private roads within the County have been assigned County Road Numbers or Names. The numbers or names are used for identification purposes to help speed emergency services and to assist in locating utilities. County road numbers do not necessarily mean the roads are maintained by the County. The Planning Department is responsible for naming roads. All proposed names for new or existing roads must be reviewed by the Planning Department to insure the roads names are unique and do not duplicate or are not substantially similar to existing road names. The Board of County Commissioners, by resolution, adopts assigned road names unless the road is named on a recorded plat.

27.0.4: Application of Design Standards and Construction Specifications

All new road, bridge, and recreational pathway construction within the legal jurisdiction of the County regardless of whether the road, bridge, or recreational pathway is maintained publicly or privately and any additions to, realigning or upgrading of existing roads, bridges, or recreational pathways, whether public or private, commencing after November 2, 2005 shall adhere to the Road and Bridge Design Standards and Construction Specifications unless a variance is granted in accordance with Section 27.6.

27.0.5: Construction of New Roads and Recreational Pathways

27.0.5.1: New Roads and Recreational Pathways to be built by Applicants

New development shall be required to mitigate its proportionate share of the impacts of the proposed activity on the road or recreational path system. Where new roads and recreational pathways are proposed by an Applicant, the Applicant's proposal shall include:

A. an analysis of the projected 20 year traffic volumes,

B. information on existing topography,

C. surface drainage,

D. extent of cuts and fills,

E. construction plans and specifications.

All plans and specifications for new roads and hard surface recreational pathways shall be prepared by a qualified Colorado Registered Professional Engineer proficient in road design and must include the following statement: *"These construction plans for (name of subdivision, development or project) were prepared by me (or under my direct supervision) in accordance with the requirements of those standards and specifications set forth the Archuleta County Land Use Regulations and the Archuleta County Road and Bridge Design Standards and Construction Specifications"*, name of engineer, name of firm. The statement shall be signed and stamped by the Registered Professional Engineer who prepared or directed preparation of the construction plans.

All plans and specifications submitted shall be assumed to comply with the provisions of the Archuleta County Land Use Regulations and the Archuleta County Road and Bridge Design Standards and Construction Specifications. The design engineer shall be responsible for the accuracy and adequacy of the design, dimensions and elevations on the plans and assumes all responsibility for the completeness and/or accuracy of the plans and specifications.

The plans and specifications shall be considered valid for two (2) years from the date of approval by the County Engineer, after which time such plans shall be void and will be subject to re-review and re-acceptance by the County Engineer. There shall be no substantial changes in or deviations from the plans except with the express written consent of the County Engineer.

Upon completion of the installation or construction of the improvements, the project engineer shall deliver to the County Engineer, unless waived by the County Engineer, record drawings of the improvements certified by a Colorado professional engineer proficient in road design stating that the improvements have been completed in accordance with the plans approved by the County are safe, adequate and within County and other legal standards and that he/she knows of no defects in the improvements.

The road design and construction specifications shall be reviewed and approved by the County Engineer in conjunction with the preliminary plan and the County Engineer may request additional studies and information in the course of such review. Actual construction of roads and recreational pathways cannot occur until the project is approved by the Board of County Commissioners and all requirements for bonding and/or insurance are fulfilled.

27.0.5.2: New Roads and Recreational Pathways to be built by County

Plans and specifications for roads and recreational pathways to be built by the County shall adhere to the road design standards and construction specifications contained in these regulations, and shall be reviewed and approved by the County Engineer prior to commencement of construction.

27.0.6: Upgrading of Existing County Roads and Recreational Pathways

27.0.6.1: Upgrading Needed to Accommodate New Development

For the purposes of this section, and when considering the need for upgrading existing County roads, new development shall include, but not be limited to, the creation of residential, commercial, and industrial properties, mining, logging, drilling, and recreational activities. New development shall be required to mitigate its proportionate share of the impacts of the proposed activity on the County's road system.

Where new development is proposed along existing County roads, the Applicant's proposal shall include an analysis of the projected traffic volumes, along with information on existing road widths, curves, intersections, and surface drainage. The traffic study shall be performed by a qualified registered professional engineer licensed in the

State of Colorado knowledgeable in traffic engineering at the expense of the Applicant. The County Engineer shall review the analysis and may request additional information or studies or make recommendations for improvements necessary to accommodate the additional traffic to be generated by the new development.

All plans and specifications for upgrading existing roads and recreational pathways shall be prepared by a qualified Colorado Registered Professional Engineer proficient in road design and must include the following statement: *"These construction plans for (name of subdivision, development or project) were prepared by me (or under my direct supervision) in accordance with the requirements of those standards and specifications set forth the Archuleta County Road and Bridge Design Standards and Construction Specifications"*, name of engineer, name of firm. The statement shall be signed and stamped by the Registered Professional Engineer who prepared or directed preparation of the construction plans.

All plans and specifications submitted shall be assumed to comply with the provisions of the Archuleta County Land Use Regulations and the Archuleta County Road and Bridge Design Standards and Construction Specifications. The design engineer shall be responsible for the accuracy and adequacy of the design, dimensions and elevations on the plans and assumes all responsibility for the completeness and/or accuracy of the plans and specifications.

The plans and specifications shall be considered valid for two (2) years from the date of approval by the County Engineer, after which time such plans shall be void and will be subject to re-review and re-acceptance by the County Engineer. There shall be no substantial changes in or deviations from the plans except with the express written consent of the County Engineer.

Upon completion of the installation or construction of the improvements, the applicant's project engineer shall deliver to the County Engineer, unless waived by the County Engineer, record drawings of the improvements certified by a Colorado professional engineer proficient in road construction stating that the improvements have been completed in accordance with the plans approved by the County and are safe, adequate and within County and other legal standards and that he/she knows of no defects in the improvements. Such a statement must be received by the County Engineer before any release of financial guarantees covering road improvements is granted by Archuleta County.

These standards will establish maximum traffic volumes for certain functional classifications of roadways as stated in Table 27-3. If a proposed development will cause these maximum limits to be exceeded on the adjacent roads and recreational pathways providing access between the development and the State Highway System, the Applicant shall be responsible for its proportionate share of the cost of improving the affected roads and recreational pathways to a functional classification where the maximum is not exceeded. See Section 27.1.3.4 for methods of payment. In calculating whether the maximum limits will be exceeded, the projected cumulative traffic volume based on surrounding land uses and not just counts of existing traffic levels shall be used.

27.0.6.2: Upgrading Requested by Property Owners

In many instances, roads and recreational pathways in older subdivisions in Archuleta County are substandard because they were built prior to the County having an adequate system for enforcing road design standards and construction specifications. Many of these roads and recreational pathways are too steep or too narrow for the County to maintain.

In some instances, the County may consent to the upgrading of existing roads and recreational pathways within a subdivision to correct these problems, provided such upgrades are at the expense of the property owners served by such roads and recreational pathways. Upon request of the property owners, the County may assist in the formation of a local improvement district. Such districts are allowed to finance construction of the improvements over a fixed period of time, usually ten years. Completion of the improvements does not in itself constitute acceptance for maintenance by the county. (See Section 27.5.2 for acceptance procedures for roads and recreational pathways constructed through local improvement districts.)

Property owners may provide for upgrading and/or maintenance of existing roads and recreational pathways within

a subdivision at the expense of the property owners served by such roads and recreational pathways. Upon request of the property owners, the County may assist in the formation of a public improvement district (P.I.D). PIDs are allowed to finance construction of improvements and/or maintenance over an indefinite period of time to be determined by the property owners. Information about PIDs and LIDs is available in the county Administration Office.

27.0.7: Permits for Road, Bridge and Recreational Pathways Construction

Prior to the commencement of construction of any new road, bridge, or recreational pathway, improvements to an existing road, bridge, recreational pathway, or work within public road rights-of-way, the Applicant must obtain a Right-of-way permit as outlined in the following sections:

1. Access Permit Requirements (Section 27.3 of these regulations).
2. Other Work Within the Right-of-way Requirements (Section 27.4 of these regulations).

27.0.8: Road Vacations

State statutes concerning definitions, vesting of title upon vacation, methods of vacation and limitations of actions, as provided in C.R.S. § 43-2-301 et seq. shall control vacation proceedings, as supplemented by this section. All applications for the vacation of public rights-of-way initiated by parties other than the county shall be submitted to the County Engineering Department and must include a vicinity map showing the following:

1. The location of all adjacent properties and any structures within 150 feet of the boundaries of the proposed vacation;
2. Land uses for those adjacent properties;
3. Locations of all existing utilities, in or adjacent to the proposed vacation;
4. Existing rights of ways within a 500-foot radius of any right-of-way proposed for vacation;
5. A boundary and improvement survey and map, as may be requested by the county engineer, prepared in an original form to be recorded at the office of the county clerk and recorder.

In addition to the foregoing, the applicant must submit a written request addressing the reasons for requesting the vacation, a letter from any involved utility companies stating the company's position on the proposed vacation and the names and addresses of all adjacent property owners within 500-feet of all boundaries of the right-of-way or easement requested for vacation If the requested vacation is within a platted subdivision, a replat of the subdivision shall be processed through the Planning Department.

Eligible applications for the vacation of public rights-of-way that are initiated by the County must be processed as follows:

1. The road and bridge department shall request a public hearing be scheduled before the board of county commissioners. At least ten days before any such hearing, notice of the hearing shall be mailed by first class mail to the last known address of each landowner who owns land within 500 feet of the right-of-way that is proposed to be vacated. Such notice shall include the time and place of the county commissioner meeting and shall indicate that a resolution to vacate the county roadway will be presented at the meeting.

3. At the hearing, the road and bridge department and any affected landowner shall be entitled to present evidence. If the board of county commissioners determines in their discretion that the requirements of this section are met, and that it is in the best interests of the county to do so, the board of county commissioners may by resolution vacate the right-of-way or a portion thereof with such conditions or reservations as are proper. Title to the vacated lands shall vest pursuant to C.R.S. § 43-2-302.

Pursuant to C.R.S. § 43-1-202.7, if any roadway is vacated or abandoned by the county, the documents vacating or abandoning such roadway, including but not necessarily limited to any resolution, ordinance, deed, conveyance document, plat or survey, shall be recorded in the office of the clerk and recorder of the county.

27.1: ROAD, BRIDGE, AND RECREATIONAL PATHWAY DESIGN CRITERIA

27.1.1: Purpose and Intent

This section sets forth specific standards for roadway, bridge, and recreational pathway design in Archuleta County and is intended for use by design engineers.

27.1.2: Road Functional Classifications

County roads are classified according to function. C.R.S. § 43-2-109 requires the Board of County Commissioners to select the county primary and secondary system of roads on the basis of greatest general importance to the system. C.R.S. § 43-2-110 sets forth specific requirements for the selection and adoption of the county road system and the adoption of an official map of the road system of the county. The official map is reviewed and revised by the Board of County Commissioners on a regular basis and functional classifications are recommended by the Engineering Department. Criteria used to design roadways are based on their functional classification. For planning purposes, Archuleta County uses the following functional categories in classifying its roads:

27.1.2.1: Principal Arterials

A principle arterial is a continuous access-controlled road that serves corridor movements having trip length and travel density characteristics indicative of statewide travel. At the time these standards and specifications were adopted all principle arterials in Archuleta County were administered by the Colorado Department of Transportation.

27.1.2.2: Minor Arterials

Minor arterials link major traffic generators such as towns, recreation areas, and subdivisions. They provide a means of intra-county travel. Arterials should provide for relatively high overall travel speeds with minimum interference to through movements.

27.1.2.3: Major Collectors

Major collectors provide a link between minor collectors and arterials. Collectors should be designed so they do not disrupt the activities and land uses they serve. In addition, access to collectors should be designed so it minimizes interruption of traffic flows.

27.1.2.4: Minor Collectors

Minor collectors are spaced at intervals consistent with population density. These roads accumulate traffic from local access roads and provide direct routes through neighborhoods to major collectors and arterials.

27.1.2.5: Local Access Roads

Local access roads provide direct access to and connections between individual residences, businesses, community facilities, and other land uses within neighborhoods. They also link individual properties to the collector and arterial roadway network and serve travel over relatively short distances. Local access roads constitute all roads not classified as arterials, collectors, low volume roads, or primitive roads.

27.1.2.6: Low Volume Roads

Low volume roads have the same function as local access roads and have a design average daily traffic volume that does not exceed 400. Low volume roads provide connections from these areas to roads with higher functional classifications.

27.1.2.7: Primitive Roads

A primitive road is a single or two-lane road providing direct access to rural, recreational, and scenic areas.

27.1.3: Road Design

A qualified Colorado Registered Professional Engineer proficient in road design shall prepare all road designs, plans, and specifications.

27.1.3.1: Future Planning

Prior to the design of a new or an upgrade for an existing road, projections of future development and densities, estimates of future traffic volumes, appropriate functional classifications, and design speeds must be determined. The road functional classification determines the geometric cross section and maximum sustained grades, while the design speed determines minimum or maximum standards for elements of alignment such as stopping and passing sight distances, radii of curvature, tangent lengths and superelevation transition lengths. Standard structural sections or designed structural sections may be used.

A. Design Period: Roadway design will be based on the projected needs twenty (20) years after construction.

B. Projected Development: Projections of development over the design period will be based on the County Master Plan in effect and on existing land use, proximity to developed areas, historic growth and other factors which can be expected to influence development.

C. Projected Traffic Volumes: Table 27-2 presents traffic generated for various types of development. For example, residential property generates an average daily traffic (ADT) count of ten trips per living unit. These per unit ADT counts are applied to the projected development to generate estimates of the design year traffic volumes. When per unit ADT counts are not listed for a type of development or an ADT has not been established for a particular category or location by the Engineering Department, the design engineer shall use the Transportation and Traffic Engineering Handbook by the Institute of Transportation Engineers to obtain the appropriate ADT count.

27.1.3.2: General Design Elements

A. Design Capacities: Table 27-1 presents the range of ADTs anticipated for each type of road. If traffic volumes on a particular road exceed the range specified for its functional category, the road shall be reclassified to the appropriate category. However, roads may carry lower volumes than stated for their functional category without being reclassified. In such cases, the function of the road rather than traffic volumes will determine design requirements.

B. Design Speed: Principally the character of terrain, traffic volumes and appropriate range of design speeds for each road functional classification influence the selection of design speed. Design speed shall be a minimum of 5 MPH over the posted or proposed speed limit.

In Colorado Basic Prima Facie Speed Limits are:

Open Mountain Highways	40 mph
Residential Areas	30 mph
Business Districts	25 mph
Narrow, Winding Mountain Roads	20 mph

C. Surfacing Requirement: All roads serving areas with projected densities of two units per acre or greater, or expected to carry a traffic volume of 700 ADT or greater must be paved. Other roads may have a gravel or a paved surface

D. Right-of-Way: The minimum right-of-way widths required for each road functional classification are specified in Table 27-3. Additional right-of-way shall be provided for drainage improvements, cuts or fills, intersections, curb returns, snow storage, recreational pathways, and other road appurtenances.

E. One Way Roads: One way roads will not be allowed for the following reasons:

1. Property owners at the far end of a one way loop road tend to take short cuts and drive the wrong way to reach their properties, thus increasing the chances for accidents.

2. Emergency vehicles must in certain cases take a more circuitous route to reach their destination.

3. One-way roads can cause confusion for people not familiar with the area.

4. In winter, snowplowing often reduces the driving surfaces of roads because snow accumulates along the edges. On one-way roads, this reduction may pose a serious safety problem because it hampers access for emergency vehicles, and limits the area available for their operation.

F. Striping: Paved roads may be striped with appropriate centerline and shoulder stripes per the Manual of Uniform Traffic Control Devices and CDOT Standard S-627-1. This specification shall apply to collector and higher functional classification roads or other roads as determined necessary by the County Engineer.

27.1.3.3: Specific Design Elements

A. Alignment: The major considerations in alignment design are safety, grade, profile, road width, design speed, sight distance, topography, drainage, and the maneuverability, braking, and performance of heavy duty vehicles. Alignment should provide for safe and continuous operation at a uniform design speed. In mountainous areas, consideration should be given to locating the road so that a southern exposure will be obtained wherever possible. Road layout should bear a logical relationship to existing or platted roads in adjacent properties and to the principles of good engineering practice. All roads shall be designed such that the roads are centered in the right-of-way.

1. Horizontal Alignment

a. Stopping Site Distance: Horizontal alignment must provide at least the minimum stopping distance for the design speed at all points. This includes visibility at intersections as well as around curves and roadside encroachments. The minimum stopping sight distance is the distance required by the driver of a vehicle traveling at the design speed to bring the vehicle to stop after an object on the road becomes visible. Stopping sight distance is calculated in accordance with the following formula, or Table 27-4, whichever is greater:

$$D=1.47Vt + \frac{V^2}{30(f+G)}$$

V = speed in MPH
t = reaction time (2.5 seconds)
G = grade, in percent
f = coefficient of sliding friction - with f equaling the following factors based on design speed of roadway:

Design Speed (MPH)	**f** (Design Criteria: Snow Packed)
20-40	.24

40-50	.22
50-60	.21
60-70	.20

Where an object off the traveled way restricts site distance, the stopping sight distance determines the minimum radius of curvature, but in no case will it be less than as specified in Table 27-5.

Offset clearance to achieve stopping sight distance on horizontal curves can be obtained from Table 27-23. The centerline of the inside lane is used, with the offset distance measured from the centerline of the inside lane to the obstruction.

b. Passing Sight Distance: Passing sight distance is the minimum sight distance that must be available to enable the driver of one vehicle to pass another safely and comfortably without interfering with oncoming traffic traveling at the design speed. Two-lane roads should provide adequate passing zones. Required passing sight distance for given design speeds are stated in Table 27-4.

c. Curvature: Table 27-5 specifies the minimum centerline radius of curvature for specific design speeds. This table is based on speed alone and does not take into consideration sight distance factors. Every effort should be made to exceed the minimum values.

Consistency in design speed and curve radii should be used to avoid surprising the driver. Where changes in the design speed are necessary, the design speed between approach tangents and curves will not change by more than 10 MPH. Under no condition will a low speed curve be introduced at the end of a long tangent where high approach speeds are anticipated. Compound curves should be avoided. Reversing curves without an intervening tangent will not be permitted where design speeds exceed 25 MPH. The minimum lengths of such tangents are specified in Table 27-5. Broken-back curves are not allowed.

d. Curb Returns: Curb returns or pavement rounding radii at intersection corners are as follows:

Road Class	Curb Return Radius
Primitive & Local	25 Feet
Collector	35 Feet
Arterial	35 Feet

Additional right-of-way will be required to provide a minimum clear distance of fifteen (15) feet between the curb or edge of pavement and the right-of-way limit.

e. Intersections: The minimum distance between intersections for various road functional classifications is as follows:

Road Class	Minimum Distance	Minimum Site Distance
Local	300 Feet	400 Feet
Collector	500 Feet	600 Feet
Arterial	1000 Feet	800 Feet

Distance is measured from the inside edge of each right-of-way.

2. Vertical Alignment

a. Minimum and Maximum Grades: With the exception of Primitive Roads minimum and maximum sustained grades shall be 0.5% and 8%, respectively, except as provided in item b below. Increases in grade will be permitted for sections of road where the horizontal radius of curvature exceeds 1,500 feet

as follows:

i. 1% for 500 feet maximum to a maximum of 9%
ii. 2% for 200 feet maximum to a maximum of 10%

No two such sections will be within 500 feet of each other or within 500 feet of a curve having a radius of less than 1500 feet.

All grades will flatten to 3% or less for at least 100 feet approaching intersections. Grades approaching the turnarounds in cul-de-sacs, where approved, will be 4% or less for at least 50 feet.

These distances will be measured from the intersection of the rights-of-way lines.

The maximum design grade should be used infrequently rather than as a value to be used in most cases.

b. Exception to Maximum Grades: A local access, low volume, or primitive road may have sections with a grade of 12% provided all of the following conditions are met:

i. The section shall be no longer than 500 feet.
ii. The section shall have a horizontal radius of 1500 feet or greater.
iii. Grades shall not exceed 6% for 500 feet on either end of the section.
iv. Curves with a horizontal radius of less than 600 feet shall not be within 500 feet on either end of the section.

c. Vertical Curves: Vertical curves must be designed to provide adequate stopping and passing sight distance, headlight distance, driver comfort and good drainage.

Stopping sight distance requirements control minimum lengths of crest vertical curves.

Vertical curves that are long and flat may develop poor drainage and should therefore be avoided.

Vertical curves are not required where the algebraic difference in grade is less than 1.0%.

d. Site Distance: The grade line must meet sight distance requirements for the design speed. Table 27-4 provides the minimum stopping and passing sight distances for the crest of vertical curves.

3. Switchbacks: A switchback is defined as a curve with a delta greater than 120 degrees and a radius less than 100 feet.

a. Use of Switchbacks: Switchbacks will not be allowed on collector or arterial roadways. On local access, low volume, or primitive roadways when other alternatives may cause significant adverse impacts, the use of switchbacks may be allowed on a case-by-case basis, with approval from the County Engineer.

b. Minimum Design Standards: Switchbacks shall be designed with a minimum centerline radius of 60 feet. Maximum centerline grades within 25 feet of a switchback curve and throughout the curve shall not exceed 4%. Curve widening shall be in accordance with Section 27.1.3.3.B.7. Adequate snow storage must be provided.

4. Alignment Coordination:

When vertical and horizontal curves are superimposed, the superelevation may cause distortion in the outer pavement edges. Where this may be the case, edge of pavement profiles shall be plotted and smooth curves introduced to remove any irregularities. Sharp horizontal curves should not be introduced at or near a

pronounced summit or sag.

B. Geometric Cross Sections

1. Typical Sections: A typical section for each road functional classification is shown in Figures 27-1 through 27-6.

2. Travel Lane Width: The minimum travel lane width for major arterials, arterials and collectors is 12 feet, for local access roads is 11 feet, and for low volume and primitive roads is 10 feet.

3. Crown Slope: On undivided roads in tangent alignment, the high point of the crown will be centered on the traveled way and the roadway sloped toward the edges on a uniform grade. In mountainous terrain, unpaved roads will be sloped toward the cut side of the road on a 3% slope to alleviate surface erosions. On divided multilane roads on tangent alignment, each travel way will have a uniform cross-slope with the high point at the edge nearest the median. The crown slope shall not exceed the percentages shown in Table 27-6.

4. Superelevation: To account for snow and ice conditions that occur frequently in Archuleta County, the maximum superelevation will be limited to 0.08 feet per foot (see Table 27-7). The axis of rotation of undivided roadways is usually the centerline. For curves following long, level tangents, the axis of rotation may be taken at the inside edge of the pavement. For divided roads with wide medians, the axis of rotation shall be the inside edge of pavement. For divided roadways with narrow medians, each roadway shall be rotated about the edge adjoining the median strip.

5. Superelevation Transition: Superelevation transition is the progression of the roadway from the normal crown section to a fully superelevated section. To meet the requirements of safety and comfort, the length required to effect the transition should be adequate for the likely travel speeds. Suggested minimum lengths are given in Table 27-7. It is recommended that 60 to 80 percent of the superelevation runoff be on the tangent.

6. Spiral Curves: Where the alignment includes spiral curves, superelevation is applied entirely on the easement curve. For recommendations on design of spiral (easement) curves, see A Policy on Geometric Design of Highways and Streets, American Association of State Highway and Transportation Officials.

7. Curve Widening: Curves will be widened where required by high truck traffic on the inside radius in accordance with AASHTO; A Policy on Geometric Design of Highways and Streets; Chapter 3 - Horizontal Alignment - Offtracking.

8. Cul-de-Sac Roads or Turnarounds (where approved): Whenever possible roadway systems shall provide at least two access points to lots platted for development. Where cul-de-sac roads are approved turnarounds shall be provided. Bulb type turnarounds shall have a minimum road surface of 90 feet in diameter and a minimum right-of-way of 110 feet in diameter. An alternative to the bulb type turnaround is the use of a hammerhead turnaround. Figure 27-7 illustrates three acceptable hammerhead configurations.

   The maximum length of roads ending in turnarounds shall be 600 feet in areas with a high wildfire hazard and 1000 feet in all other areas. When a variance from this standard is requested, at least one of the following shall be provided:

   a. central water service,

   b. an alternative water supply acceptable to the local fire authority,

   c. monitored residential sprinklers in all residences on the cul-de-sac.

   In addition, turnouts may be required when a variance is requested.

Snow storage shall be provided as shown in Figure 27-7 to keep turnarounds cleared. Dead end roads that do not have turnarounds are not allowed.

C. Structural Sections

1. Design Structural Sections: Structural sections shall be designed for all new roads, driveways, or roads being upgraded due to increased traffic. The design engineer is responsible for the design using proper engineering methods. The following equation is an example of a method that may be used.

$T = .0384\ (TI)(100-R)$ or
$T = 1.811\ (TI)(2.12-\log CBR)$

Where,

T = Thickness in inches
TI = Traffic index
R = Resistance (stabilimeter test)
CBR = California Bearing Ratio

a. Traffic Index: The effect of traffic and weather on a roadway over its design life is expressed by the traffic index (TI). Table 27-8 shows the minimum traffic index values for different road functional classifications. The County Engineer may increase these minimums if existing or future traffic warrants.

b. Minimum Structural Requirements: The minimum structural sections outlined in Table 27-9 shall be adhered to on all roads in Archuleta County. These minimum structural sections are based upon a minimum subgrade "R" value of 60 or a CBR of 17. For "R" values less than 60 or a CBR less than 17, an engineered section must be designed. The Applicant shall submit "R" value tests performed by an approved geotechnical engineer prior to approval of the final road design. All asphalt shall be placed in multiple lifts with each lift being 1-1/2" minimum or 3" maximum.

c. Concrete Paving: Areas where a considerable amount of stopping or starting occurs, such as bus stops or signalized intersections, shall be paved with a designed concrete section to minimize the effects of dynamic loading on the pavement.

D. Drainage

1. General: The primary objective of drainage design is protection of County roads and property while minimizing the possible flood damage to surrounding properties and structures. It should be emphasized that good drainage is one of the most important factors in road design. It preserves the appearance as well as the level of service of the road while minimizing maintenance costs. Water flowing in a roadside ditch shall be diverted away from the road as quickly as possible. In no case shall water travel in a roadside ditch for a distance greater than 800 feet or have a flow greater than five (5) cubic feet per second with the occurrence of a 25-year frequency storm.

Culverts under all roads shall be designed to accommodate a 25-year frequency storm runoff utilizing the maximum available head. The maximum available head shall be determined by the uppermost ponding elevation chosen to prevent flood damage to upstream properties.

Inlets and other facilities draining the road surface shall accommodate the 25-year frequency storm runoff. All roads shall remain free of ponding.

All drainage installations shall be designed to permit free, unobstructed passage of debris and silt or provide for their deflection and/or collection at a point upstream that will not create an expensive maintenance problem. Settlement basins shall be provided when a silting problem may exist downstream.

Modification of natural channels or transferring runoff from one basin to another is not permitted except where no reasonable alternative exists and where the proposal has been reviewed and approved by the County Engineer.

Drainage design shall anticipate areas of potential ice build up.

French drains that accommodate any off right-of-way drainage problem shall be designed to provide a minimum of 50 feet of overland sheet flow before reaching any roadside ditch.

2. Storm Runoff Estimates: The following methods may be used for estimating peak flows:

   a. Runoff from stream flow records.

   b. HEC-1 or HEC-HMS Computer Programs from the Corps of Engineers.

   c. Technical Manual Model for Estimating Flood Characteristics from the Colorado Water Conservation Board.

   d. The Soil Conservation Service Method TR-55

   e. The Rational Method for areas of less than five (5) acres. See Table 27-24 for rainfall intensity duration curves.

3. Culverts: Culverts shall be located at each natural draw or water course as conditions warrant to prevent excessive accumulation of flow in roadside ditches or along the toe of slopes. Draws and watercourses shall be cleared of debris for a distance of 100 feet upstream from all culvert inlets.

   Inverts at the inlet shall be slightly elevated above the normal flow line in steep or natural draws to avoid plugging by debris. Inlets shall not be elevated in those instances where ponding or accumulation of backwater curves would be objectionable (stagnation, irrigation ditches, etc.). The culvert shall slope downward in the direction of natural flow and be designed to be self-cleaning whenever possible. The outlet shall be designed not to discharge on unprotected fills or unstable material or at adverse angles to streams or open channels. Headwall, riprap or other means of protection are required at inlets or outlets where erosion might occur.

   Velocities of flow in culverts and open channels shall be calculated using acceptable design charts of formulas. Where the Manning Equation is used; the following “n” values will apply:

Material	Manning Equation “n” Values
Corrugated Steel Pipe	.027
Reinforced Concrete Pipe	.013
Concrete lined open channel	.013 to .020
Asphalt lined open channel	.016

   Corrugated steel pipe, high density polyethylene, or an approved equal as specified by the Engineering Department shall be used. Steel pipe shall be asphalt coated where soils are corrosive or other conditions exist that may attack steel. Aluminum or other pipe materials are not permissible for road culverts.

   Minimum diameter for round pipe shall be 18 inches, unless otherwise approved by the Engineering Department. The minimum rise for squash pipes shall be 12 inches.

   When a battery of pipes is used, a clear spacing of ½ the pipe diameter (one foot minimum, four foot maximum) must be provided between pipes. Minimum and maximum cover, pipe metal gauge, and strength classification shall be as specified in section on culverts (see Section 27.2.3.6).

Cleanout access shall be provided at least every 200 feet for pipes 24 inches in diameter or less and at least every 400 feet for larger pipes. Cleanout access shall also be provided at each angle point and at each change in grade.

4. Open Channels and Ditches: Channels and ditches shall be designed to avoid roadside safety hazards. The minimum flow line slope shall be 0.50%. The maximum permissible velocities given in Table 27-11 shall control maximum slopes.

   Manning's equation shall be used to estimate velocities.

$$V = \frac{1.486 R^{2/3} S^{1/2}}{n}$$

   where

   V = velocity of flow in channel in feet per second
   n = roughness coefficient (Table 27-11)
   R = hydraulic radius in feet
   S = slope in feet per foot

   Where the channel is comprised of a combination of the materials given in Table 27-10, the maximum permissible velocity elected should prevent undue scouring of the finer materials and silting downstream.

5. Subsurface Drainage: Subgrades subject to poor drainage, underground seepage or a high water table shall be adequately drained for roadbed stabilization. Drains shall be installed if necessary to prevent the high ground water level from coming within four feet of the roadway pavement. Perforated pipe shall be used in French drains; French drains that contain no pipe are unacceptable.

6. Inlet Structures: Curb openings with protection bars are preferred. The County Engineer will permit other designs on approval. Grates are not permitted where pedestrians, bicycles or debris-laden flows are anticipated.

E. Side Slopes: A registered professional geologist, geotechnical engineer, or civil engineer qualified in soils analysis shall evaluate and render an opinion on the stability of slopes designed steeper than 3:1. Where heavy snowfall is expected, flatter slopes in cuts on the southern side of the roadway should be used to provide maximum exposure to the sun. Flatter slopes should be used wherever possible to reduce erosion, to decrease maintenance costs, to facilitate plant growth and to provide for safer operation.

   Transition slopes shall be provided between adjoining cuts and fills and shall be designed for pleasing appearance. Where cut or fill slopes intersect the original ground surface, the cross section shall be rounded to blend the slope into the natural ground surface.

   Where the slope of the original ground approaches 1.5:1, the embankment shall be contained with a suitable retaining wall to avoid long fill slopes. Side slopes in rock will be based on the stability of the formation. Retaining walls on the uphill side shall be a minimum of ten (10) feet from the centerline of the adjacent drainage ditch.

   Benching of side slopes should be used sparingly and only where they are justified by sound engineering reasons, including the following:

   1. to stabilize material where benching is more economical than flattening,

   3. to intercept drainage in long and deep cuts,

4. to intercept and store loose material.

F. Sidewalks: Sidewalks shall be required where in the opinion of the County Engineer and the Planning Department, the number of pedestrians is sufficient to interfere with traffic, or significant pedestrian usage is anticipated. Where sidewalks are installed, the individual property owners shall be responsible for clearing snow and ice from the sidewalks in front of their property.

27.1.3.4: Payment of Costs for New Road Construction

A. Applicant Responsibility: Any and all costs of new road construction in new developments and attributable to the development are the responsibility of the Applicant. The Applicant is also responsible for constructing the new roads according to the standards and specifications set forth herein or otherwise required by law.

B. **Fair Share Reimbursement for Improvements.**

1. Purpose

The purpose of this section is to state the conditions and describe the procedures pursuant to which subdividers who are required by the County to install or construct public improvements as part of the subdivision approval process may be reimbursed for a share of the costs of installing or constructing such public improvements by subsequent developers whose property makes use of a share of such improvements.

2. Authority

Authority to allow and require fair share reimbursement for prior improvements is specifically conferred by C.R.S. § 30-28-133 (12) and more generally by C.R.S. § 30-28-101 et seq. (Planning, Zoning, and Subdivision) and C.R.S. § 29-20-101, et seq. (Local Land Use Control Enabling Act).

3. **General Definitions**

For the purpose of this Article, the following terms shall have the meaning indicated below:

a. Original Subdivider: A subdivider who installs or constructs one or more Improvements that the County requires to be installed or constructed pursuant to the subdivision approval process, or an assignee or successor in interest to such Original Subdivider. For the purposes of this definition, the term "subdivider" shall have the meaning assigned to it pursuant to C.R.S. § 30-28-101 (9). For the purposes of this regulation, a public or governmental authority may not be considered an Original Subdivider and may not seek Fair Share Reimbursement, as defined below.

b. Secondary Developer: A private party that owns and is seeking to develop a Benefited Property and, pursuant to these regulations, may be required to reimburse an Original Subdivider for a fair share of the Costs of certain Improvements that the Original Subdivider installed pursuant to the subdivision approval process. For the purposes of this regulation, a public or governmental authority may not be considered a Secondary Developer and may not be subject to Fair Share Reimbursement, as defined below.

c. Benefited Property: Any property identified in a Cost Recovery Statement as being benefited by Improvements installed by an Original Subdivider.

d. Costs: Any County approved monetary expenses incurred and paid by an Original Subdivider for the installation or construction of an Improvement that the County requires to have installed under the

subdivision approval process and that is directly related to such installation, inclusive of design and planning. Costs may include, but are not limited to, land acquisition, materials, labor, engineering, survey, title, management, supervision, consulting, legal, and other professional matters, including any pro rata portion of any expenses incurred in the installation of multiple improvements or facilities. However, under no circumstances may Costs include the expenses incurred in preparing a Cost Recovery Statement.

e. Date of Completion: The date that the County accepts dedication of an Improvement or, in the case of an Improvement to which the County does not require dedication, the date of the County's release of the collateral for the installation of the Improvement.

f. Improvement: Any type of structure or facility for public use that the County requires be installed by an Original Subdivider as a condition or requirement of final plat approval of a subdivision, and which will benefit one or more adjacent or other properties, including, but not limited to, any street or road and any facilities related to streets or roads, water distribution systems, sewage collection systems and storm drainage facilities. The Improvement may be internal as well as adjacent to or outside of the legal description of the Original Subdivider's subdivision.

g. Fair Share Reimbursement: A reimbursement of the Costs of installing an Improvement, paid by a Secondary Developer to the Original Subdivider for that share of the Costs related to capacity of the Improvement that is projected to be used by the Secondary Developer's property. An Improvement may be eligible for Fair Share Reimbursement under these regulations only if the Costs of such Improvement exceed $100,000.00.

4. Procedure for Applying for Fair Share Reimbursement

a. Original Subdivider's Submission of Proposed Cost Recovery Statement. An Original Subdivider desiring to seek Fair Share Reimbursement for the Costs of any Improvement shall submit to the Planning Department a proposed Cost Recovery Statement (hereinafter, a "CRS") for each Improvement, which shall include all of the submittals required below, no later than the date of application by the Original Subdivider for Final Plat Approval for the subdivision. This regulation contemplates the possibility that there may be multiple CRS's per subdivision, but under no circumstances shall an Original Subdivider be entitled to submit more than one proposed CRS for a particular Improvement. The Original Subdivider shall submit the following items as part of the proposed CRS:

i. A clear description and drawing of the Improvement together with an itemized statement of the estimated Costs of the Improvement. The estimated Costs of an Improvement shall be the amount determined by the County Engineer to be the amount necessary to guarantee funds for the completion of the Improvement prior to the approval of the final plat for the Original Subdivider's subdivision, exclusive of any percentage of overage (i.e. contingency) required by the County. An Original Subdivider must amend such CRS to include the final and actual Costs of an Improvement once such Improvement has been completed and actual Costs may be finally calculated.

ii. A statement, report, or study, including any data in support thereof, prepared and/or certified by a professional engineer proficient in the design of the improvement being evaluated, that expresses the maximum capacity of the Improvement, as well as the estimated usage of the Improvement that will be incurred by the Original Subdivider's subdivision once such subdivision is functioning at its maximum capacity, in quantitative terms generally accepted by professionals in the relevant area of expertise, and consistent with any County procedures. In addition, the Original Subdivider should calculate the net remaining capacity of the Improvement after subtracting the maximum usage expected to be utilized by Original Subdivider's subdivision (as calculated above), from the total maximum capacity of the Improvement.

iii. A calculation that relates the quantitative measurement derived per the requirements of the

above-stated paragraph ii to a dollar cost per said quantitative measurement. For example, in the case of street or road the amount should generally be expressed in terms of dollar cost per average daily trip (ADT) or similar terms.

iv. A list of all properties, identified by parcel number, to which the Original Subdivider proposes to subject to Fair Share Reimbursement of the Costs of the Improvement, any of which hereinafter shall be referred to as a potential Benefited Property, together with a scaled drawing or survey establishing the location of the relevant Improvement in relation to these properties. For all such properties, Original Subdivider shall provide a list of the names and mailing addresses of the owners of such properties. For purposes of determining a property owner's address, the Original Subdivider shall use the most current records of the Archuleta County Assessor's Office for the property.

v. For all potential Benefited Properties, Original Subdivider shall include an explanation describing or identifying the essential nexus between such property and its potential use of the Improvement such that any Fair Share Reimbursement that may be required for the development of such property shall comply with the requirements of C.R.S. § 29-20-203 and the United States and Colorado Constitutions.

b. Notice to Potential Benefited Property Owners. Within ten (10) days of the submission of the proposed CRS to the Community Development Director, the Original Subdivider shall prepare and deliver by first class mail a notice of possible inclusion in the CRS to all owners of the potential Benefited Properties named in the CRS, which notice shall also include a copy of the proposed CRS. Such notice shall also inform the owners of any potential Benefited Property that they have the right to comment on the proposed CRS to the Planning Department and at any hearing on the Final Plat Approval of the subdivision or at any other hearing of the Board scheduled for consideration of the proposed CRS. Such potential Benefited Property owners shall also be noticed by Original Subdivider regarding

(i) any amendment to the proposed CRS under review,
(ii) the findings of the Planning Department, and
(iii) the date and location of the Final Plat Approval Hearing for the subdivision to which the proposed CRS is attached.

c. Planning Department's Review. Prior to any hearing on Final Plat Approval, for the subdivision to which the proposed CRS is attached and within 20 days of the submission of such proposed CRS to the Planning Department, the Planning Department shall review the proposed CRS. The review shall include, but not be limited to,

(i) confirming the accuracy and veracity of the Costs (including any estimated Costs) as well the reasonableness and appropriateness of the Costs by way of comparison of the Costs to prevailing rates,
(ii) assuring the consistency of the CRS with technical and professional standards,
(iii) determining that the CRS does not disproportionately or inequitably attempt to shift the Costs of constructing the relevant Improvements to other property owners,
(iv) determining that all of the potential Benefited Properties are adjacent to or will have presumed use of the Improvement when developed, and
(v) ensuring that the proposed CRS is in general conformance to the requirements of paragraph 27.1.3.4.B.4.a.i. above.

At any time during this review, the Original Subdivider may amend the proposed CRS either of its own volition or pursuant to any request from the Planning Department. In reviewing the proposed CRS, the Planning Department may request additional information from the Original Subdivider so as to enable it to confirm or better understand the information presented therein. Following such review, the Planning Department shall issue a written report on the proposed CRS to the Board of County Commissioners stating whether or not the factors set forth in (i) through (v) herein have been satisfied and recommending either the approval or denial of the proposed CRS.

d. Board of County Commissioner's Review at Final Plat Approval. The proposed CRS shall be submitted for consideration by the Board at the Final Plat Approval Hearing for the subdivision to which the proposed CRS is attached. At such hearing, the Board may consider additional evidence and testimony

presented by the Original Subdivider, any owner of potentially Benefited Property or any other member of the public. Thereafter, as part of any final decision regarding final plat approval of the subdivision, the Board shall decide to approve or reject any proposed CRS attached thereto. The Board's decision shall be based upon:

(i) whether the CRS meets the criteria set forth in paragraph (c) above, and

(ii) whether, in the Board's discretion, approval of the proposed CRS is in the overall best interests of the County.

e. Recording of Cost Recovery Statement. As soon as practicable after the Board's issuance of its final determination, the Original Subdivider shall prepare and submit to the County Clerk and Recorder for recording a Notice of Fair Share Reimbursement in the chain of title for each Benefited Property in the form prescribed by the Planning Department. Recording of the Notice of Fair Share Reimbursement is merely a statement that a unique government land use regulation may apply to a property; said Notice is not a lien or any other type of encumbrance on the chain of title for said property. Such Notice shall specify it is valid only for a period of ten years following the Date of Completion of the Improvement and shall automatically expire at such time. The Original Subdivider shall mail a copy of the Notice by first class mail to each Benefited Property owner at the time of recording.

5. Procedure for Payment of Fair Share Reimbursement

a. Duration of Fair Share Reimbursement Obligation. A Secondary Developer's obligation to reimburse an Original Subdivider for a fair share of the Costs of an installed Improvement shall exist for a period of 10 years from the Date of Completion of the relevant Improvement.

b. Secondary Developer's Preliminary Report and Community Development Director Review. Prior to any final hearing on the proposed development of a Benefited Property, a Secondary Developer must submit to the Planning Department a statement, report, or study, including any data in support thereof, concerning the proposed development's anticipated use of any relevant Improvement to which a CRS has been approved and recorded for such property. Such statement, report or study must be prepared and/or certified by a professional engineer proficient in the design of the improvement being evaluated, and any proposed use shall be stated in a quantity consistent with the rate established in the CRS for the relevant Improvement. The Planning Department shall review such statement, report or study for several purposes, including, but not limited to,

(i) assuring the consistency of such statement, report or study with technical and professional standards, (ii) determining whether or not the Benefited Property will have use of the Improvement,

(iii) determining what proportion of the Improvement's maximum capacity the Benefited Property will use when developed to its maximum capacity and

(iv) determining that requiring Fair Share Reimbursement of the Secondary Developer would not disproportionately or inequitably shift the Costs of constructing the relevant Improvements to Secondary Developer.

Following such review, the Planning Department shall issue a written report to the Board recommending whether or not Fair Share Reimbursement of such Improvement should be required of the Secondary Developer.

c. Notice to Original Subdivider of Planned Development. At least 14 days before the date of any final hearing before the Board on approval of the proposed development of a Benefited Property, the Secondary Developer shall send notice of such hearing to the Original Subdivider.

d. Final Hearing of Secondary Developer. At the final hearing on approval of the proposed development of a Benefited Property, the Planning Department shall present its recommendations pursuant to the Fair Share Reimbursement obligation of the Secondary Developer. The Secondary Developer and the Original Subdivider shall also have an opportunity to present evidence and comment concerning the proposed development's anticipated use of any relevant Improvement. Following the presentation of such evidence, the Board shall determine, based upon such evidence, whether the Secondary Developer's development is likely to use the relevant Improvement and the quantity of such usage. The extent of this usage shall be

multiplied by the dollar cost per rate of such usage as stated in the CRS to determine the Fair Share Reimbursement obligation of the Secondary Developer for the Costs of the Improvement. The Original Subdivider shall be entitled to interest on this amount at the rate of six percent (6%) per annum, simple interest, calculated from the date of recording of the CRS. The Board's finding shall be final on the matter.

e. Payment of Obligation Required before Recording of Final Plat or Issuance of Development Permit. Once the Board's determination in Section 27.1.3.4.B.5.d. has been made, the County shall not permit either a final plat or development permit related to the Secondary Developer's development to be recorded or issued unless and until the Secondary Developer shall

(i) tender, or attempt in good faith to tender, good funds in full to the Original Subdivider in the amount established by the Board and

(ii) provide adequate proof to the Planning Department that such funds have either been paid or that a good faith effort has been made by the Secondary Developer to deliver funds to the Original Subdivider.

Upon receipt of the funds, Original Subdivider shall record a Release of Claim for Fair Share Reimbursement in the chain of title for each relevant property. For the purposes of attempting to tender such funds, the Secondary Developer shall be determined to have acted in good faith if they have attempted to contact Original Subdivider at the last addresses made available to the County and in any recorded filings in the chain of title of the relevant property.

f. Deposit of Security in Event of Dispute over Obligation. In the event that any dispute concerning the amount of Fair Share Reimbursement should arise between the County and the Secondary Developer following either final plat approval or the issuance of a development permit, such dispute should not result in an order prohibiting final plat approval, the recording of the final plat or the issuance of such development permit; any dispute should result in the Secondary Developer depositing a sum certain or other security in the registry of the relevant court in the approximate amount of the disputed Fair Share Reimbursement until such dispute has been finally decided.

g. Erroneous Release of Claim. In the event any Release of Claim for Fair Share Reimbursement is erroneously recorded, such release shall not exempt said property from its obligations under these regulations. Said property shall still be subject to its obligations under the CRS as the recording of the Notice of Fair Share Reimbursement is merely a statement that a unique government land use regulation may apply to a property; said Notice is thus not a lien or any other type of encumbrance on the chain of title for said property. In addition, the fact that a Release of Notice of Fair Share Reimbursement may have been recorded for a particular property shall not preclude the particular property from being subject to an obligation to participate in a further Fair Share Reimbursement upon a re-subdivision of the particular property.

6. Assignments

An Original Subdivider's right to pursue Fair Share Reimbursement may be transferred or assigned to a third party following the approval of a proposed CRS by the Board, and such assignee shall have all of the same rights and obligations under these regulations as the Original Subdivider. Any instrument of assignment shall be in a writing signed by the Assignor and Assignee, and each signature shall either be acknowledged or subscribed and sworn before a notary public. The instrument of assignment shall provide a full and complete description in clear and plain language of the rights being assigned in said instrument. However, any such right to pursue Fair Share Reimbursement may not at any time be pledged, hypothecated, mortgaged or charged to any firm, corporation, other entity or individual, and any such attempt to pledge, hypothecate, mortgage or charge shall be declared void and unenforceable.

7. Ineligibility to Pursue Cost Recovery

a. An Original Subdivider is not eligible to seek Fair Share Reimbursement if the Planning Department determines that there is another procedure under the Land Use Regulations that enables the Original Subdivider to otherwise receive Fair Share Reimbursement for the Costs of any otherwise eligible Improvement. Whether an Original Subdivider may apply for Fair Share Reimbursement under these regulations is an administrative decision to be made by the Planning Department.

b. Nothing in these regulations prohibits an Original Subdivider and a Secondary Developer from entering into a private agreement for the recovery of the Costs for any particular Improvement. However, any such agreement renders an Original Subdivider ineligible to seek Fair Share Reimbursement pursuant to these regulations for the relevant Improvement with respect to any property that is the subject of a private agreement.

c. In no event shall a public entity or governmental authority be eligible to seek Fair Share Reimbursement for Improvements constructed by such entity or authority, nor shall such entity or authority be subject to paying Fair Share Reimbursement to an Original Subdivider for the development of property owned by such entity or authority, regardless of whether or not a CRS has been approved for such property.

8. Appeal

The sole and exclusive remedy available to an Original Subdivider, Secondary Developer or Benefited Property owner concerning the Board's final determination regarding a CRS or Fair Share Reimbursement obligation shall be to seek judicial review.

9. **Notification by Mail/Burden to Keep County Informed of Current Address**

Whenever these Fair Share Reimbursement regulations require notice or a mailing to any person or entity, said notice shall always be sent by first class mail, postage prepaid. Any such notice shall be deemed received when mailed. In the case of notice to any potential Benefited Property, the notice shall be sent to the address stated in the most current record for the property in the records of the Archuleta County Assessor's Office. In the case of notice to any Original Subdivider, the notice shall be sent to the last known address of the Original Subdivider as stated in the file of the Community Development Commission or in recorded filings for the relevant Benefited Properties. In the case of notice to any Secondary Developer, the notice shall be sent to the last known address as stated in the files of the Planning Commission for the relevant subdivision or property.

C. Impact Fees: Impacts directly attributable to development often necessitate a variety of on and off site facility improvements to the affected County roads and the cost of these improvements is properly attributable to the development that benefits from such facility improvements. However, Applicants should not be responsible for more than their proportionate share of such improvements. As such, on occasion the County will enter into negotiated agreements with Applicants wherein Applicants shall be required to mitigate their proportionate share of the impacts of the proposed activity on the County's road system. This may require construction of improvements to existing roads, intersections and bridges, the construction of new roads and bridges, on and off site, or payment to the county of sufficient funds to be used exclusively to improve existing roads or to construct new roads off-site in accordance with the conclusions of a traffic study or review performed and completed by the Applicant.

27.1.4: Upgrading Existing Roads

27.1.4.1: Design Standards

All County roads requiring upgrading or improvement and all new roads, of any functional classification, required to access any development, subdivision, or lots within subdivisions shall comply with the Road and Bridge Design Standards and Construction Specifications. All formulas, tables, and figures in this document are provided for convenience. The design engineer is responsible for the design using proper engineering methods.

Serving New Developments

1. Requirement for Upgrading: Existing County roads serving a new development or an area proposed for either platting or re-platting must be upgraded to the Road Design Standards when one or more of the following conditions occur:

   a. Existing roads do not meet the Road Design Standards for the functional classification.

   b. Existing roads meet local access design standards, but the projected ADT will exceed 700, thus requiring paving of the roads.

   c. Existing roads meet local access design standards, but the projected ADT exceeds the maximum for local access, thus requiring improvement to collector or arterial status (see Table 27-3).

2. Payment of Costs: The Applicant shall be responsible for their proportionate share of all costs directly attributable to the impacts their project will have upon existing County roads.

3. Payback of Costs: The Board of County Commissioners may establish a plan of compensation to the original Applicant whereby subsequent beneficiaries pay a fair share for the use of those improvements. Such a plan would be administered by the County and made a condition of approval for future benefiting developments. The Board of County Commissioners shall determine the equitable distribution of benefits and costs.

27.1.5: Bridge Design

27.1.5.1: Design Standards for Bridges

Bridges shall conform to the Colorado Department of Transportation standards and specifications. Plans shall be prepared by a qualified structural engineer licensed in Colorado and shall be submitted to the County Engineer for review and approval prior to construction. Clear deck width must accommodate the full width of the travel lanes and shoulders of approach roads.

The waterway area shall accommodate a 100-year frequency storm. Where flood studies from the U.S. Army Corps of Engineers or the Federal Emergency Management Agency are available, bridges shall be designed to accommodate the "Standard Project Flood". A minimum of one-foot freeboard is required. Additional freeboard shall be required when debris-laden flows are anticipated.

27.1.5.2: Payment of Bridge Construction Costs

If the design of the roadway serving a new development requires construction of new bridges the Applicant shall be required to pay the cost of such construction. The Applicant shall be responsible for their proportionate share of all costs directly attributable to the impacts their project will have upon existing County bridges.

27.1.6: Traffic Safety

27.1.6.1: Guardrails

Guardrails are installed to prevent accidents by delineating the roadbed, to reduce accident severity by deflecting vehicles into safer paths, and to reduce the rate of deceleration in case of impending collisions with fixed objects.

A. Design and Placement of Roadways: Only state approved guardrails shall be used. The length of guardrail should be planned in multiples of 12.5 feet. No abrupt or projecting ends shall face toward approaching traffic and delineators shall be installed according to Colorado Department of Transportation specifications M-606. Ordinarily, guardrail is placed only on the outside of curves.

1. When guardrail is used in conjunction with roadside curbs, the face of the guardrail shall be flush with the face of the curb regardless of shoulder width. This is to prevent the takeoff ramp effect that may overturn a vehicle. When no curb is present, the face of the guardrail shall be flush with the edge of the shoulder.

2. On curves requiring a reduction in approach speeds, any one of the following conditions suggests installation of guardrail on the outside of the curve is needed:

    a. Height of embankment is more than ten feet.

    b. Side slopes are steeper than 3:1.

    c. Shoulder or pavement widths are substandard.

    d. Roadside hazards are present.

3. Whether on curves or tangents, consideration should be given to the installation of guardrail if there is a history of roadway accidents or if unusually high embankments or steep terrain give motorists a feeling of insecurity.

4. In areas subject to low visibility or snow and ice conditions, or where traffic speed and volumes are high, guardrail may be needed where its installation would otherwise be questionable under less adverse conditions.

5. Other Conditions Requiring Guardrails: Guardrails may be required under the following conditions:

    a. An obstruction or sudden constriction in roadway.

    b. An isolated sharp curve on a roadway otherwise built to higher standards.

    c. Approaches to bridge piers, abutments, trees or other obstructions.

B. Guardrail at Bridge Approaches: Guardrail should be placed at the ends of all bridges on the right of approaching traffic. Where pedestrians are expected to use the shoulder, a walkway should be provided around the end of the guardrail outside the normal shoulder lines.

C. Provisions for Snow Storage: When guardrails are considered for installation, especially for extended lengths, provision shall be made for adequate snow storage and removal.

27.1.6.2: Traffic Control Devices

All signs, striping, markers, delineators, signals and other traffic control devices must conform to the requirements of the Manual on Uniform Traffic Control Devices published by the U.S. Department of Transportation Federal Highway Administration.

All new developments shall be signed and marked in accordance with the Manual on Uniform Traffic Control Devices and shall be installed and paid for by the Applicant. Requests for nonstandard signs or other devices shall be submitted to the County Engineer along with all data required to support the request and must be approved prior to installation

27.1.6.3: Sight Distance Triangle

A. Determining Dimensions and Location of Sight Distance Triangles: For safety and visibility purposes, a sight distance triangle shall be maintained at road intersections and where driveways intersect roads. The distances along the legs of the sight distance triangle shall be measured from the corner or intersection point along the

right-of-way lines or along edge of driving surface for driveways as shown in Figure 27-8. Where a road right-of-way is wider than normal or varies in width because it has been expanded to include cut and fill slopes or drainage improvements, the line along which the legs of the sight distance triangle are measured shall be parallel to the roadway at normal right-of-way width for the type road under consideration (see Figure 27-9). For each intersection, the length of the legs of the triangle shall be determined by the functional classification of the roadways which form the intersection as follows:

Driveways	10 Feet
Low Volume	30 Feet
Local Access	30 Feet
Collector	50 Feet
Arterial	70 Feet

Examples of several typical combinations are provided in Figure 27-10.

The area enclosed by the three sides of the triangle shall form an imaginary plane. The edges of this plane which lie along right-of-way lines shall be equal to the height of the corresponding point along the curb, or if there is no curb, to the elevation of the corresponding point along the centerline of the road. No landscape materials, earth berming, signs, structures, or other visual obstructions shall be allowed between 3-1/2 feet and 7 feet above the surface of this plane (see Figure 27-11). This regulation is not intended to prohibit the planting of trees or retention of existing trees in the sight distance triangle, if they are pruned so branches are higher than seven feet. Installation of traffic control signs or signals and streetlights are exempt from this regulation.

B. Incorporating Requirement for Sight Distance Triangles into Subdivision Design: Applicants shall incorporate the requirement for maintenance of a sight distance triangle at road intersections and intersections of driveways with roads in the design of subdivisions submitted for County review after the effective date of this regulation. Particular attention shall be given to the size and shape of corner lots.

C. Enforcing Requirement When Building Permits Issued:

1. Where a building permit is filed for property which is unplatted or was platted prior to the effective date of these regulations, no building permit shall be issued for a structure which interferes with maintenance of a sight distance triangle unless application of the requirement would result in peculiar and exceptional practical difficulties to, or exceptional and undue hardship upon, the individual proposing development of the property. The County Engineer shall have authority to waive the requirement for maintenance of a sight distance triangle for such property.

2. Where a building permit application is filed for property that was platted or re-platted after the effective date of this regulation, no building permit shall be issued for any structure that would interfere with the maintenance of a sight distance triangle required by this regulation.

D. Continuing Enforcement of Requirement: Property owners shall be responsible for maintaining sight triangles free of visual obstructions for that portion of a triangle which falls within the boundaries of their property. When the County Engineer receives a complaint concerning visual obstructions at a particular intersection, the Engineering Department shall be responsible for inspecting the intersection and for taking the following measures:

1. Determining whether the visual obstruction is within the sight triangle for an intersection, and if it is on public or private property.

2. If the visual obstruction is on public property, requesting the appropriate jurisdiction remove the obstruction; if the jurisdiction is the County, requesting assistance from the Road & Bridge Department if needed and supervising removal of the obstruction.

3. If the visual obstruction is on private property, notifying the property owner of the requirement that visual

obstructions must be removed within 30 days except as follows:

a. If the obstruction is a permanent structure which was built prior to the effective date of this regulation, or was granted a waiver as provided in Section 27.1.6.3.C.1, the property owner shall not be required to remove the structure.

b. Where the obstruction is caused by the natural or historic topography of the property, and not by earthwork undertaken by the current property owner or his immediate predecessors, the property owner shall not be required to re-grade his property in order to remove the obstruction.

If the property owner does not comply within 30 days, further enforcement action shall be taken as provided in Section 27.7 of these regulations.

27.1.6.4: Aboveground Utility Location

All aboveground utilities including but not limited to power poles, telephone junction boxes, transformers, etc. shall be located as close to the outside edge of the right-of-way as possible but in no case shall there be less than a ten (10) foot separation from the edge of road shoulder and the utility (SEE Figure 27-21). However, fire hydrants shall be installed no less than ten (10) feet nor more than fifteen (15) feet from the edge of road shoulder. This will eliminate any interference with normal road maintenance operations and increase the safety of the traveling public.

27.1.6.5: Rural Free Delivery Multi Box Modules

In subdivisions where provisions were not specifically made for rural free delivery multi box modules, the homeowners association, or if one does not exist, a designated group from the subdivision shall be responsible for submitting a proposal to the Engineering Department. The submitted proposal shall first consider locations in front of or adjacent to the property owners requesting the installation of a multi box module. Engineering shall evaluate all sites in front of or adjacent to property owners requesting rural mail delivery before evaluating any other sites. In evaluating the proposal, staff shall determine if the proposed site meets all the following criteria

- The Postal Service will provide delivery service to the area proposed.
- The module shall be a minimum of 10 feet from the edge of shoulder of the road.
- Adequate space for an 8 foot wide by 40-foot long pull off shall be provided.
- The pull off shall be constructed per Archuleta County Road & Bridge Design Standards and Construction Specifications.
- A minimum sight distance of 250 feet in all directions shall be provided.
- The pull off shall not have a grade in excess of 3%.
- Adequate space for snow storage and removal within the right-of-way or appropriate snow stack easement shall be provided.
- The site shall not adversely impact the normal flow of traffic or the surrounding properties.

In addition, the following information shall be provided:

- If the proposed location is adjacent to private property, the affected property owner(s) shall provide a letter stating they have no objection to the module location.
- A letter signed by the homeowners' association president or other approved individual indemnifying Archuleta

County from any damage that may occur due to road maintenance operations (see Figure 27-12).

Once a site meeting these criteria has been located, the Applicants shall stake the proposed location of the module and the edge of the right-of-way. The right-of-way shall be staked for a distance of 50 feet on either side of the proposed location of the module. Upon completion of the staking, the Engineering Department, and the Road & Bridge Department shall inspect the proposed site to insure all the site requirements are met before giving preliminary approval. The Engineering Department will inform the Applicants by written notice that they can begin construction once they obtain a right-of-way permit (Section 27.4). After construction has been completed, a final inspection shall be done to insure the module was properly installed and the pull off was constructed to County standards and specifications. All deficiencies shall be corrected before final approval can be given to start mail service.

The homeowners association or other designated group from the subdivision shall be responsible for all costs associated with the construction of the module and pull off and all future maintenance including snow removal of the pull off area. Individual mailboxes on individual properties will not be allowed in new areas requesting rural mail delivery.

27.1.7: Driveways and Parking Areas

27.1.7.1: Requirement for Access Permit

Whenever a property owner, Applicant, contractor or other individual proposes to connect a driveway or parking area to be public roadway, they must obtain a permit to work in the right-of-way from the Engineering Department prior to commencing construction. The submittal requirements and procedure for obtaining access permits are stated in Section 27.3 of this code.

27.1.7.2: Requirement for Grading Permit

[Reserved]

27.1.7.3: Design Standards for Driveways

A driveway is defined as an access way for vehicles providing a connection from a public or private roadway to either individual single family residences or to a parking area serving multi family, commercial, recreational, institutional, or industrial land uses. For purposes of this regulation only, single-family residences shall be defined as individual detached houses or duplexes (two single family residences) either of which are on individual platted lots or on footprint lots with the surrounding property held in common ownership. If an access way serves more than four individual single-family residences, it shall be classified as a roadway rather than a driveway and must meet the County's standards and specifications for road construction. A driveway may provide access to a common parking area for multi family residential development if the development meets all Archuleta County regulations for multi family development. An access way serving a working ranch or farm and any associated residence regardless of length shall be considered a driveway, and shall meet only such standards as are necessary for public health and safety and as outlined in Section 27.1.7.

A. Location of Driveways Relative to Intersections: Driveways shall be placed so the following minimum distances are maintained to any road intersection, including a T-intersection on the opposite side of the road from a property where a driveway is proposed.

    1. Where the driveway connects to a local access or low volume road, a minimum distance of 50 feet from curve return to edge of right-of-way at the intersection shall be maintained.

    2. Where a driveway connects to a collector or larger road, a minimum distance consisting of the left turn stacking distance plus 20 feet as measured from curve return to curve return, shall be maintained. The left

turn stacking distance shall be determined by the Engineering Department based on available data from an acceptable traffic study. If a traffic study is not available, or data provided is incomplete, the Engineering Department shall estimate the length of the left turn stacking distance using the following formula:

$$\text{Peak Hour Traffic} = \frac{\text{ADT}}{10}$$

Peak hour left turns = 1/6 of peak hour traffic for 4-way intersections
Peak hour left turns = ¼ of peak hour traffic for T-intersections
[1.5 x peak hour left turns x 20'] + 20' = driveway to intersection spacing

The Engineering Department may make adjustments in the factors used in this formula for a typical situation. Examples of such situations include the intersection of low volume roads with very high volume roads, or where adjacent land uses cause traffic patterns to be skewed. If an applicant disagrees with the left hand turn stacking distance determined by the Engineering Department, they may propose a different distance if substantiated by a traffic study which is acceptable to the Engineering Department.

B. Spacing of Driveways: Driveway openings shall be separated by at least 30 feet, as measured from curve return to curve return, or else shall be combined. More spacing may be required for traffic safety and proper traffic operation.

C. Shared Driveways: Applicants or property owners proposing the use of shared driveways shall record an easement defining the location of the driveway and either a covenant or deed restriction requiring construction of the driveway at that location.

D. Driveway Widths: The dimensions of driveway widths and centerline curve radii shall be as shown in Table 27-12.

E. Driveway Grades: Driveways shall have a maximum grade of 8% for the section of the driveway that is within the right-of-way. Driveways shall provide a reasonable transition in terms of grade between the driveway and the ditch line. The driveway shall maintain a grade equal to the crown slope of the road, but no less than 2%, from the point where the driveway meets the road to where the driveway crosses the ditch line. This transition is needed to eliminate plows catching their blades on driveways with abrupt grade changes in the vicinity of the roadway.

F. Vehicle Turnarounds: All driveways exiting onto arterial roads, collector roads or roadways with average daily counts greater than 1,000 ADT shall be designed with a vehicle turnaround to avoid vehicles having to back onto the roadway when exiting. Single-family residence driveways in excess of 400 feet in length shall provide an adequate turnaround for emergency equipment within 150 feet of the dwelling unit. Driveways serving multi family, industrial, or commercial development shall provide a turnaround as specified in Figure 27-7 if the driveway has a dead-end.

Surfacing of Driveways: Driveways serving single-family residences may be either graveled or paved. Driveways serving duplexes that access graveled roads may be either graveled or paved. Driveways serving duplexes that access paved roads must be paved.

Where a driveway is to be graveled, the surface within the county right-of-way shall be constructed in accordance with Section 27.2.3.8.A, and shall be constructed of four inches of compacted aggregate base course. Graveled driveways that access paved roads must have a paved apron that extends at least 10 feet from the edge of the paved roadway. A permit to work within the right-of-way is required.

Where a driveway is to be paved, the surface within the county right-of-way shall be constructed in accordance with Section 27.2.3.9.A and 27.2.3.9.C and shall be constructed of four inches of compacted aggregate base course and two inches of Hot Mix Asphalt, which can be placed in one lift. Paved driveways that access graveled roads must have a graveled section that extends at least 10 feet from the edge of the

roadway. A permit to work within the right-of-way is required.

Concrete paving on driveways may approach no closer than 10 feet to the edge of the roadway. The remainder of the driveway shall match the existing roadway material. In areas that have concrete curb & gutter or concrete sidewalks a concrete driveway may end at these existing concrete structures. A permit to work within the right-of-way is required.

Driveways serving multifamily residences or commercial uses must be designed and paved in accordance with Section 27.1.3.3.C, and 27.2.3.9, with TI equaling 6.0.

G. Provision for Drainage: Driveway design shall make adequate provision for drainage and prevention of erosion.

Drainage from driveways shall be diverted to roadside ditches or other appropriate drainage way. Drainage from driveways shall not flow onto roads.

When necessary to handle roadside drainage, driveways shall use culverts, drainage pans or other devices suitable for the conveyance of roadside drainage. Final approval for the types of drainage items used and the locations of such items shall be at the discretion of the County Engineer or the Road & Bridge Department.

Culverts shall be corrugated steel pipe, high density polyethylene, or other material approved by the Engineering Department. In addition, culvert design and installation shall be in compliance with the following:

1. Culverts shall have either flared end sections or shall have end treatments per Figure 27-18 of these standards and specifications.

2. There shall be a minimum of 12 inches of cover over the culvert unless approved by the Engineering Department.

3. In general culvert lengths greater than 30 feet are not allowed in residential areas. Longer culverts may be approved in areas with large amounts of fill.

4. Drainage pans shall be designed per Figure 27-19. Concrete for drainage pans shall be either Class A or B as specified in the latest edition of the Colorado Department of Transportation Standard Specifications for Road, Bridge and Recreational Pathways Construction.

H. Property owners shall be responsible for keeping their culverts clean and ice-free. Road & Bridge may require owners to heat tape their culvert to insure flow during the winter months to minimize the potential of ice forming on roadways.

I. Minimum Site Distance: Driveways shall be designed and located to provide a minimum sight distance clear of all obstructions, natural or man-made, for at least 200 feet in either direction on local access roads and 400 feet on collector roads or as outlined in Table 27-4 whichever is greater.

J. Signage at Junction with Roadway: Stop signs shall be installed at the junction of a driveway with a roadway for all driveways serving ten or more residential units, commercial shopping areas, or when required by the County Engineer for protection of public safety.

K. Number of Driveway Accesses: Single family and duplex residences may only have one access point onto the County road system unless a minimum separation of 250 feet can be provided. Otherwise, looped driveways are not allowed. Where a lot has two different roads to provide driveway access, access or accesses shall be drawn from a single roadway and always onto the road with the lowest functional classification.

L. Snow stack Space: Snow storage for driveways shall be provided on the owner's property. Use of the right-of-way for snow storage by private individuals or companies is prohibited (C.R.S. 43-5-303).

M. Connection to Roads: The portion of driveway through the right-of-way connecting the property with the physical roadway shall be the shortest perpendicular distance possible.

N. If earth disturbance results in cut or fill slopes steeper than 1.5 ft horizontal to 1.0 ft vertical, a retainage system shall be required. If the proposed retaining system is less than 4.0 ft in height, a detail of the proposed retaining system must be provided to the County Engineer for approval, prior to installation. If the retaining system is over 4.0 ft in height, the retaining system must be designed by a Colorado Registered Professional Engineer proficient in structural design and must be submitted to the County Engineer for approval, prior to installation. In addition, prior to any occupancy permits being authorized, a certification from the Design Engineer must be submitted to the County Engineer, stating that construction of the retaining system was in conformance with the approved design and these standards and specifications.

27.1.7.4: Design Standards for Parking Areas

A. Parking Design Standards: See the Archuleta County Land Use Regulations for standard parking requirements for development. When a driveway is serving a multi family development, a minimum of an additional one half (1/2) space per dwelling unit of common parking area shall be provided if the required parking per the Archuleta County Land Use Regulations is provided by private individual garages and associated driveways.

B. Parking Area Grades: Parking areas shall have a maximum grade of 4%, and a minimum grade of 0.5% to facilitate drainage.

C. Surfacing of Parking Areas: Paving is not required for parking areas and drives serving single family units, or for duplexes where the road providing access is not paved. Where roads are paved, parking areas for duplexes must be paved. Parking areas and drives for all other types of development must be paved with a minimum of six inches of road base compacted to at least 95% of the maximum dry density at +/- 2% of optimum moisture content as determined by AASHTO T-180 and two inches of asphalt. Paved parking areas for all other development shall be designed in accordance with Section 27.1.3.3.C, with TI equaling 6.0.

D. Provision for Drainage in Parking Areas: Parking area design shall make adequate provision for drainage and prevention of erosion. Drainage from parking areas shall flow to roadside ditches or other approved drainage ways. Drainage from parking areas shall not flow onto roadways. Collection points for runoff across parking areas shall be provided to minimize sheet flow.

E. Placement of Parking Areas on Fill: If a parking area is to be placed on fill, the fill used shall be a suitable material as specified by a registered geotechnical engineer. The fill shall be compacted to at least 95% of the maximum dry density at +/- 2% of optimum moisture content as determined by AASHTO T-180 with slopes at no more than three to one and protected by rip-rap to prevent erosion from snow storage. Parking areas on fill may be designed using retaining walls as an alternative with the approval of the County Engineer.

F. Use of Parking Area on Properties with Steep Driveway Grades: In instances where construction of a single family or duplex unit is proposed, and it is not possible to build a driveway with a grade of 8% or less, a parking area which meets County standards and specifications may be built adjacent to the road which provides access to the lot. The parking area must be outside the road right-of-way. The parking area shall be sized such that vehicles can be maneuvered within the parking area and will not be backed on to the road when exiting. The minimum size for parking areas shall be 400 square feet for each unit served. Parking areas shall not be designed so vehicles are parked end-to-end, parallel to the road, but must allow for cars to be parked side-by-side. This requirement can only be used on properties platted prior to November 2, 2005 (see Section 27.1.7.3.E).

G. Snow stack Storage: Snow storage for parking areas shall be provided on the associated private property. Use of the right-of-way for snow storage by private individuals or companies is prohibited (C.R.S. 43-5-301).

H. Parking Dimensions: Parking space dimensions and parking lot layout are per Figure 27-14.

27.1.8: Landscaping

Pursuant to C.R.S. § 35-5.5-115, it is the duty of each county and each state board, department or agency to ensure that all public roads, public highways, public rights-of-way and any easements appurtenant thereto under the jurisdiction of each such entity are in compliance with the Colorado Noxious Weed Act, C.R.S. §§ 35-5.5-115. Therefore, whenever roadways, driveways, parking areas, bridges, recreational pathways or other types of construction results in earth disturbance, revegetation and/or landscaping is required.

Revegetation and /or landscaping work shall be in accordance with the approved plans and specifications as part of any permit issuance.

Earth cuts, embankment slopes and all other areas where the ground cover has been disturbed during the course of construction shall be well re-vegetated and landscaped equal to or better than conditions existing prior to construction.

Landscaping and Revegetation material shall be installed in accordance with the approved plans and specifications and shall be fertilized, mulched and otherwise treated to provide an established stand of vegetation by the end of the first full growing season after completion of construction.

The individual responsible for construction shall post a performance bond guaranteeing the revegetation and reforestation for at least two full growing seasons following installation.

Areas not disturbed by construction shall be left in their present vegetative state, except that thinning of trees may be required. In no case shall landscaping in the right-of-way or on private property impede the normal maintenance operations of the Road & Bridge Department or the normal flow and operations of traffic.

27.1.9: Recreational Pathways

Recreational pathways are categorized, but not limited to the following:

- Shared Roadways
- Signed Shared Roadways
- Bike Lanes
- Shared use paths
- Unpaved (Soft) paths

All new bicycle paths/trails shall be either shared use recreational pathways, or unpaved (soft) paths. The Engineering Department per Section 27.6 may consider the construction of other types of paths/trails.

27.1.9.1: Definitions

For the purpose of this section, the following definitions shall apply:

A. Bicycle – Every vehicle propelled solely by human power upon which any person may ride, having two tandem wheels, except scooters and similar devices. The term “bicycle” for this section also includes three and four wheeled, human powered vehicles, but not tricycles for children.

B. Bicycle Facilities – See “Recreational Pathways”

C. Bicycle lane or Bike Lane – A portion of roadway, which has been designated by striping, signing and pavement markings for the preferential or exclusive use of bicyclists.

D. Bicycle Path or Bike Path – See "Shared Use Path".

E. Bicycle Route System or Bike Path System – A system of bikeways designated by the jurisdiction having authority with appropriate directional and informational route markers, with or without specific bike route numbers. Bike routes should establish a continuous routing, but may be a combination of any and all types of bikeways.

F. Bikeway – A generic term for any road, street, path, or way which in some manner is designated as being available for bicycle travel, regardless of whether such facilities are designated for the exclusive use of bicycles or are to be shared with other transportation modes.

G. Highway – A general term denoting a public way for the purposes of vehicular travel, including the entire area within the right-of-way, or recreational pathway easement.

H. Rail-Trail – A shared use path built within the right-of-way, or recreational pathway easement of an existing, or former railroad, that is either paved or unpaved.

I. Recreational Pathways – A general term denoting improvements and provisions made by public agencies to accommodate or encourage bicycling, including parking and storage facilities, mapping all bikeways, and shared roadways not specifically designated for bicycle use.

J. Right-of-Way or Easement – A general term denoting land, property, or interest therein, usually in a strip, acquired for or devoted to transportation purposes.

K. Roadway – The portion of the highway, including shoulders, for vehicle use.

L. Shared Roadway – A roadway which is not officially designated and marked as a bicycle route, but which is open to both bicycle and motor vehicle travel. This may be an existing roadway, street with wide curb lanes or a road with paved shoulders.

M. Shared Use Path – A bikeway physically separated from motorized vehicular traffic by an open space, or barrier and either within the highway right-of-way, or within an independent right-of-way, or recreational pathway easement. Shared use paths will also be used by pedestrians, skaters, wheelchairs, joggers and other non-motorized users.

N. Shoulder – The portion of the roadway contiguous with the traveled way for accommodation of stopped vehicles, for emergency use and for the lateral support of sub-base, base and surface courses.

O. Sidewalk – The portion of the road or highway right-of-way, or recreational pathway easement designated for preferential or exclusive use by pedestrians.

P. Signed Shared Roadway (Signed Bike Route) – A shared roadway that has been designated by signing as a preferred route for bicycle use.

Q. Traveled Way – The portion of the roadway for the movement of vehicles exclusive of shoulders and auxiliary lanes.

R. Unpaved or Soft, Path – Paths not surfaced with asphalt or Portland cement concrete.

27.1.9.2: Design Standards for Recreational Pathways

The design of Recreational pathways shall be in accordance with these standards and with the latest editions of the *Guide for the Development of Bicycle Facilities*, published by the American Association of State Highway and

Transportation Officials. The design of unpaved (soft) trails shall be in accordance with these standards and with the *Trail Construction and Maintenance Handbook*, published by the U.S. Forest Service. In the event there are discrepancies between standards, the more stringent standards shall govern.

A. General Design Elements

1. Restrictions on Earth Disturbing Activities:

   a. Wetlands: The construction of recreational pathways in wetland and stream setbacks shall conform to the United States Army Corps of Engineers.

   b. Adjacent to Trail Right-of-way/Easement: Every attempt should be made by the landowner to maintain a significant vegetative buffer along trail rights-of-way and easements. The vegetative buffer will benefit the trail users and homeowners by providing visual screening and reducing noise disturbance.

B. Specific Design Elements for Shared use paths

The major considerations in alignment design are safety, grade, profile, path/trail width, design speed, sight distance, topography, drainage and environmental impacts. Path/trail layout should bear a logical relationship to existing paths/trails or platted easements in adjacent properties and to the principles of good engineering practice. All shared use paths shall be designed such that the shared use paths are centered in the right-of-way or easement.

1. Horizontal:

Minimum requirements for curve radii shall be calculated using the following formula:

$$\frac{R = 0.067V^2}{TAN\theta}$$

where,

R = Minimum radius of curvature (ft.)
V = Design Speed (mph)
θ = Lean angle from the vertical (Degrees)

15 degrees shall be considered to be the maximum lean angle for non-superelevated shared use paths.

Refer to Table 27-19, Minimum Radii for shared use paths based on 15° Lean Angle, for minimum radii requirements.

When the lean angle is greater than 15° and less than or equal to 20°, the minimum design radius of curvature becomes a function of the superelevation rate of the pathway surface, the coefficient of friction between the bicycle tires and the surface, and the speed of the bicycle. For this situation, the minimum design radius of curvature can be derived from the following formula:

$$R = \frac{V^2}{15\left(\frac{e}{100} + f\right)}$$

where,

R= Minimum radius of curvature (ft.)
V= Design Speed (mph)
e = Rate of Bikeway superelevation (Percent)
f = Coefficient of Friction

For shared use paths, the maximum superelevated rate shall be 2%. When transitioning a 2% superelevation from one side of the path to the other, a minimum 15-foot transition distance shall be used. See Table 27-20, Minimum Radii for Shared Use Paths Based On 2% Superelevation Rates and 20° Lean Angle, for minimum radii requirements.

2. Environmental Impacts: Shared use path alignments shall be designed to fit the existing topography and vegetation.

   Preference will be given to those alignments, which result in the least possible environmental impact.

3. Vertical Alignment: Grades - Grades on shared use paths shall be kept to a minimum, especially on long inclines. When terrain dictates, grades over 5% are acceptable provided the grades and length of incline are as follows:

5-6%	for up to 800 ft
7%	for up to 400 ft
8%	for up to 300 ft
9%	for up to 200 ft
10%	for up to 100 ft

Grades over 10% are not allowed.

In addition, the following mitigation measures shall be incorporated into the design, for grades over 5%:

- An additional 6 ft of width is required.
- Provide signing alerting bicyclists of the maximum percent of grade per the latest edition of the ***Manual of Uniform Traffic Control Devices***. (MUTCD)
- Provide recommended descent speed signing, per the latest edition of the ***Manual of Uniform Traffic Control Devices***. (MUTCD).
- Exceed minimum stopping sight distances.
- Exceed minimum horizontal clearances, recovery area and/or protective bike rail.
- Any other measures required by the Engineering Department.

4. Sight Distance: Shared use paths shall be designed with adequate stopping sight distances in accordance with these standards and the latest edition of the ***Guide for the Development of Bicycle Facilities***, published by AASHTO.

   The distance required to bring a bicycle to a full controlled stop is a function of the bicyclist's perception and brake reaction time, the initial speed of the bicycle, the coefficient of friction between the tires and the pavement and the braking ability of the bicycle.

   Table 27-21 indicates the minimum stopping sight distance for various design speeds and grades based on a total perception and brake reaction time of 2.5 seconds and a coefficient of friction of 0.25 to account for the poor wet weather braking characteristics of many bicycles For two-way shared use paths, the sight distance in the descending direction, that is, where "G" is negative, will control the design.

   Table 27-22 is used to select the minimum length of vertical curve necessary to provide minimum stopping sight distances at various speeds on crest vertical curves. The eye height of the bicyclist is assumed to be 4.5 feet and the object height is assumed to be 0 inches to recognize that impediments to bicycle travel exist at pavement level.

Table 27-23 indicates the minimum clearance that should be used for line of sight obstructions for horizontal curves. The lateral clearance is obtained by entering Table 27-23 with the stopping distance from Table 27-21 and the proposed radius of curvature.

5. Design Speed: The minimum design speed for shared use paths shall be 20 mph for level, tangent sections. For down grades greater than 4%, a design speed of 30 mph is required. The designer may consider the use of a series of short switchbacks to control speeds.

6. Geometric Cross Sections:

   a. Typical Section: A typical section for the Recreational Pathway is shown in Figure 27-20.

   b. Travel Lane Width: The minimum width of a paved shared use path is 10 feet. Where a particular route serves as a primary arterial pathway, the minimum width of a paved shared use path is 12 feet. A minimum 2 ft. wide graded area (shoulder) with a maximum 16% slope shall be maintained adjacent to both sides of the path. A 3 ft. wide shoulder with a maximum 16% slope may be required where poles, walls, fences, guardrails or other lateral obstructions exist or are anticipated. (See Figure 27-20)

      A soil sterilant is required to be placed between the aggregate base course surface and the Hot Mix Asphalt (HMA) pavement to prevent vegetation from growing through the pavement.

   c. Cross Slope: For shared use paths, the high point of the slope will begin at the outside edge of the pavement and the pavement sloped toward the cut side of the shared use path on a 2% slope. Where shared use paths are constructed on fill sections, slope direction will be to side of least erosion potential, or as otherwise directed by the County Engineer or designated representative. (See Figure 27-20)

   d. Pavement Structure: The minimum structural sections outlined in Table 27-9 shall be adhered to on all shared use path in Archuleta County. These minimum structural sections are based upon a minimum subgrade “R” value of 60 or a CBR of 17. For “R” values less than 60 or a CBR less than 17, an engineered section must be designed. The Applicant shall submit “R” value tests performed by an approved geotechnical engineer prior to approval of the final path design. Asphalt may be placed in multiple lifts with each lift being 2” minimum or 3” maximum.

   e. Structures: Bridges and all other structures shall conform to the latest edition of the Colorado Department of Transportation Standard Specifications for Road and Bridge Construction and these standards and specifications. In the event there is a discrepancy between the two, the more stringent standard or specification shall apply. Plans shall be prepared by a qualified structural engineer registered in the State of Colorado and shall be submitted to the County Engineer for review and approval prior to construction.

      Clear deck width must accommodate the full width of the travel lanes and shoulders of approach paths/trails. Where the existing path or trail is narrower than the bridge deck, a transitional approach not less than 25’ in length shall be constructed.

      The waterway area shall accommodate a 100-year frequency storm. Where flood studies from the U.S. Army Corps of Engineers or the Federal Emergency Management Agency are available, bridges shall be designed to accommodate the “Standard Project Flood”. A minimum of one-foot freeboard is required. Additional freeboard shall be required when debris-laden flows are anticipated.

      Railing, fences or barriers on both sides of the bridge shall be a minimum of 3.6’ high.

      Bridges shall be designed for pedestrian live loadings. Where maintenance and emergency vehicles

may be expected to cross the bridge, the design shall include them as well.

All bridge decks shall incorporate bicycle–safe expansion joints, and shall have a non-skid surface texture.

7. Drainage:

a. Pavements: All path/trail surfacing shall have a minimum 2%, one directional cross slope. In addition, path/trail surfacing shall be free of depressions and excessive surface voids, which create water ponding and/or ice build-up. Such items as culverts, catch basins and drainage ditches shall accomplish positive drainage away from the path/trail surface. Final approval for the types of drainage items used and the locations of such items shall be at the sole discretion of the County Engineer.

b. Culverts: Culverts under all trails shall be designed to accommodate a 10-year (minimum) frequency storm runoff utilizing the maximum available head. The maximum available head shall be determined by the uppermost ponding elevation chosen to prevent flood damage to upstream properties.

Culverts shall be located at each natural draw or watercourse as conditions warrant to prevent excessive accumulation of flow in roadside ditches or along the toe of slopes. Draws and watercourses shall be cleared of debris for a distance of 100 feet upstream from all culvert inlets.

Inverts at the inlet shall be slightly elevated above the normal flow line in steep or natural draws to avoid plugging by debris. Inlets shall not be elevated in those instances where ponding or accumulation of backwater curves would be objectionable (stagnation, irrigation ditches, etc.).

The culvert shall slope downward in the direction of natural flow and be designed to be self-cleaning whenever possible. The outlet shall be designed not to discharge on unprotected fills or unstable material or at adverse angles to streams or open channels. Headwall, riprap or other means of protection are required at inlets or outlets where erosion might occur.

Velocities of flow in culverts and open channels shall be calculated using acceptable design charts of formulas. Where the Manning Equation is used, the following “n” values will apply:

Material	Manning Equation “n” Values
Corrugated Steel Pipe	.027
Reinforced Concrete Pipe	.013
Concrete lined open channel	.013 to .020
Asphalt lined open channel	.016

Corrugated steel pipe, high density polyethylene, or an approved equal as specified by the Engineering Department shall be used. Steel pipe shall be asphalt coated where soils are corrosive or other conditions exist that may attack steel. Aluminum or other pipe materials are not permissible for road culverts.

Minimum diameter for round pipe shall be 18 inches unless otherwise approved. The minimum rise for squash pipes shall be 12 inches.

The minimum cover for culvert pipe is 12 inches.

When a battery of pipes is used, a clear spacing of ½ the pipe diameter (one foot minimum, four foot maximum) must be provided between pipes. Minimum and maximum cover, pipe metal gauge, and strength classification shall be as specified in section on culverts (see Section 27.2.3.6).

c. Ditches: Where a shared use path/trail is constructed on a side hill, a minimum 1.0' deep v-ditch shall be placed on the uphill side to intercept the hillside drainage.

Where shared use paths are not constructed on hillsides, or when shared use paths are adjacent to existing highway facilities, channels and ditches shall be designed to avoid roadside safety hazards. The minimum flow line slope shall be 0.50%. Maximum slopes shall be controlled by the maximum permissible velocities given in Table 27-11.

Manning's equation shall be used to estimate velocities.

$$V = \frac{1.486 R^{2/3} S^{1/2}}{n}$$

where,

V = velocity of flow in channel in feet per second
n = roughness coefficient (Table 27-11)
R = hydraulic radius in feet
S = slope in feet per foot

Where the channel is comprised of a combination of the materials given in Table 27-10, the maximum permissible velocity elected should prevent undue scouring of the finer materials and silting downstream.

8. Traffic Control Devices: All traffic control devices including signs and pavement marking shall be in accordance with section 27.1.6.2 of these standards and specifications.

9. Inspections: Inspections of the work shall be in accordance with Section 27.2.3.2.C of these standards and specifications.

C. Specific Design Elements for Unpaved (Soft) Trails

1. Unpaved (soft) paths/trails: The design of unpaved (soft) paths/trails shall be in accordance with the most recent edition of the ***Trail Construction and Maintenance Notebook***, published by the U.S. Forest Service. Inspection and approval of an unpaved (soft) surface trail shall be performed by a representative from the Archuleta County Engineering Department.

27.2: ROAD, BRIDGE AND RECREATIONAL PATHWAY CONSTRUCTION SPECIFICATIONS

27.2.1: Purpose and Intent

This section sets forth specific specifications for road, bridge, and recreational pathway construction in Archuleta County and is intended for use by the Applicants, property owners, contractors, and others engaging in the construction of new roads or upgrading of existing roads, building of bridges, and the construction of recreational pathways.

27.2.2: Closing of Streets, Roads, and Recreational Pathways

27.2.2.1: Notice and Operation of Road Closure

Contractors may only close streets, roads, or recreational pathways after obtaining approval for an alternate route from the County, and they shall provide detour signs. Contractors shall furnish, erect, and maintain, at their own

expense, necessary barricades, suitable and sufficient flashers, and construction signs. Contractors shall also provide a sufficient number of flagmen and take necessary precautions for the protection of the work and safety of the public around their construction operations.

If construction or operating conditions require closure of a street, road, or recreational pathway, the contractor shall provide notice as follows:

A. Submit a signage plan for review and approval by the Road & Bridge Department a minimum of forty-eight (48) hours prior to closing of the road or recreational pathway. See Section 27.4.3.4 for emergency situations.

B. Submit a written notice to the Road & Bridge Department forty-eight (48) hours prior to closing of the road or recreational pathway.

C. Notify the Archuleta County Dispatch Center of the exact location of the road or recreational pathway and the date traffic will be impeded twenty-four hours prior to closing of the road or recreational pathway.

D. Notify the appropriate local papers and radio station to announce the upcoming road or recreational pathway closure.

27.2.3: Construction of Roads and Recreational Pathways

27.2.3.1: Permits Required for Road and Recreational Pathway Construction

All work performed in a public right-of-way, including a recreational pathway, shall require the issuance of a right-of-way permit prior to the commencement of construction. Right-of-way permits must be obtained at least seven (7) days prior to the commencement of construction within a public right-of-way and are issued by the Road & Bridge Department. Any permit issued shall pertain only to the county-owned right-of-way and is in no way to be considered a permit to enter on any private property adjacent to such right-of-way, nor to alter or disturb any facilities or installation existing within the right-of-way and which may have been installed and are owned by others. Permits, when issued, shall be valid for a period of 365 days and may be renewed provided renewal is obtained prior to the expiration date of the permit**.**

27.2.3.2: Construction Inspection and Testing Requirements for Road and Recreational Pathway Construction

Quality control supervision of construction shall be done by a qualified licensed geotechnical consultant at no expense to the County. The County Engineer and his/her staff shall have the right, but not the obligation, to inspect the work throughout the construction period to verify that county specifications and regulations are being complied with. In cases where the right-of-way is not publicly dedicated, the County's engineer shall through the development improvements agreement or county issued permit be allowed to inspect the construction of the improvements and appurtenances to ensure that it abides by the approved plans. Any additional testing or corrective work deemed necessary by the County Engineer shall be done within the time determined by the County Engineer and at no expense to Archuleta County. The contractor or Applicant must contact the County Engineer twenty-four hours in advance of the required final inspection.

A. Sampling of Materials: Samples for preliminary approval or production control may be submitted by the producer to the geotechnical consultant. The geotechnical consultant must use the Colorado Division of Transportation (CDOT) Procedure #30-72 to determine the acceptability or rejection of the sample.

B. Field Density Determination: To determine the compacted in-place density of soil and soil aggregate, the geotechnical consultant may use either the CDOT Procedure #22-75 or #80-80.

The Engineering Department shall establish specific checkpoints of when inspections must be conducted and approvals granted before construction is continued as part of issuing a permit to work in the right-of-way.

Typical check points are as follows:

1. Rough grading
2. Subgrade preparation
3. Utility installations
4. Placement of road base
5. Paving (if applicable)
6. Construction of drainage improvements (including culverts for driveways, if applicable)
7. Placement of signs (if applicable)

C. Final Inspection: Upon completion of construction and prior to County approval of the completed work, copies of the as-built plans, concrete cylinder test reports, compaction test reports and other test data shall be delivered to the Engineering Department and, unless waived by the County Engineer, certified by a Colorado professional engineer proficient in road construction stating that the improvements have been completed in accordance with the plans approved by the County are safe, adequate and within County and other legal standards and that he/she knows of no defects in the improvements and a certification by a Colorado licensed Land Surveyor stating that the improvements have been constructed within the appropriate easements or rights-of-way.

The Engineering Department shall conduct a final inspection to determine if the construction meets County standards and specifications. If the inspection discloses any work, in whole or in part, as unsatisfactory, the County Engineer shall give the Applicant's engineer the necessary instructions for correction, and the contractor shall comply with and execute such instructions. At the discretion of the County Engineer, the County may withhold the granting of further building permits or any occupancy permits for the project until such time corrective work is completed.

27.2.3.3: Site Preparation

A. Utilities Protection: The applicant or contractor shall at all times take proper precautions to assure the protection of utilities, service lines, or other public or private installations and shall be responsible for the repair of any damage. The Applicant or contractor shall notify the Utility Notification Communication Center (UNCC) 1-800-922-1987 at least 48 hours before excavation begins, so the utilities can locate the services. The applicant or contractor shall also notify any utilities that do not participate in UNCC before excavation begins.

B. Grubbing: All large rocks, brush, debris, structures, and all other unsuitable material shall be cleared to a depth of at least twelve (12) inches below subgrade or as directed by the County Engineer and replaced with suitable material. Locating suitable disposal sites shall be the responsibility of the contractor or Applicant subject to County approval. Trees, except those designated to be saved, and all stumps shall be removed to a depth of at least eighteen (18) inches below the finished subgrade elevation. All trees designated to be saved shall be protected during clearing and subsequent construction operations. Suitable material removed from the excavation may be used, in so far as practical, in the formation of embankments, backfilling and for such other purposes.

27.2.3.4: Structural Embankment Construction

Embankment construction consists of constructing roadway and recreational pathway embankments including: preparation of the areas upon which they are to be placed; constructing dikes within or outside the right-of-way or recreational pathway easement; placing and compacting of approved material within roadway areas where unsuitable material has been removed; and placing and compacting of embankment material in holes, pits, and other

depressions within the roadway area. Only approved materials shall be used in the construction of embankments and backfills.

A. Benching: When an embankment is to be placed and compacted on slopes steeper than 4:1, the roadway and recreational pathway shall be continuously benched over those areas. A bench is required at vertical intervals of ten feet maximum or as required by the County Engineer. Benching shall be well keyed and where practical, a minimum of eight feet wide. (Each horizontal cut shall begin at the intersection of the original ground, and the vertical sides of the previous cuts). Material thus cut out shall be re-compacted along with the new embankment material at the contractor's expense.

B. Compaction: Minimum compaction shall be at least 90% of the maximum dry density at +/- 2% of optimum moisture content as determined by AASHTO T-180.

C. Riprap: Where embankments encroach on stream channels or lakes, calculations of the flows or wave action shall be made and submitted to the County. Based on these calculations, the County Engineer shall determine the appropriate size riprap and this riprap shall be placed along the toe of the slope to protect and embankments against erosion from water action.

D. Prohibited Materials: Organic and wet or frozen material, snow, ice, or other deleterious materials shall not be used for any structural embankment construction.

27.2.3.5: Trench Excavation

Trenches shall be excavated so that pipes can be laid straight at uniform grade, without dips or humps, between the terminal elevations shown on the drawings. Wherever a trench passes through a fill or embankment, the fill or embankment material shall be placed and compacted to an elevation twelve inches above the top of the pipe before the trench is excavated.

A. Trench Widths: Trenches shall be excavated to a width, which will provide adequate working space and side clearances for proper pipe installation, jointing and embedding. Minimum trench widths at or below an elevation six inches above the top of installed pipe shall not be less than OD plus twenty-four inches.

B. Excavation Below Pipe Subgrade: Except where otherwise required, pipe trenches shall be excavated below the underside of the pipe, as shown on Figure 27-16, to provide for the installation of granular embedding pipe foundation material.

C. Bedding Material: CDOT Type "C" Bedding shall be used for all corrugated steel pipe (except where arch encasement is required) and cast iron pipelines, as shown on Figure 27-17.

D. Placement and Compaction: Granular bedding material shall be spread and the surface graded to provide a uniform and continuous support beneath the pipe at all points between bell holes or pipe joints. It is permissible to slightly disturb finished subgrade surface by withdrawal of pipe slings or other lifting tackle.

After each pipe has been graded, aligned, and placed in final position on the bedding material and shoved home, sufficient pipe embedding material shall be deposited and compacted under and around each side of the pipe and back of the bell or end to hold the pipe in proper position and alignment during subsequent pipe jointing and embedding operations. Bedding material shall be deposited and compacted uniformly and simultaneously on each side of the pipe to prevent lateral displacement.

Type "C" Bedding shall be compacted to the top of the pipe in all areas where compacted backfill is specified.

Whenever crushed rock is used as bedding for thirty-six inch and larger pipe, the portion above the bottom of the pipe shall be vibrated with a mechanical vibratory compactor during placement to ensure that all spaces beneath the pipe are filled.

E. Backfill Over Concrete: All backfill over concrete shall conform to the following requirements:

1. Initial Backfill: To aid curing, no more than eight inches of loose backfill shall be placed over concrete after the concrete has reached its initial set.

2. Final Backfill: Additional backfill shall not be placed over arch encasements or blocking until the concrete has been in place at least three days.

F. Compacted Backfill: Compacted backfill shall consist of suitable job excavated-material, finely divided and free from debris, organic material, cinders, snow, ice or other deleterious materials, and stones larger than three inches in greatest dimension. Masses of moist, stiff clay shall not be used. Job-excavated materials shall be placed in uniform layers not exceeding eight inches in un-compacted thickness. The method of compaction and the equipment used shall be appropriate for the material to be compacted, and shall not transmit damaging shocks to the pipe. Job excavated material shall be compacted to at least 90% of the maximum dry density at +/- 2% of optimum moisture content as determined by AASHTO T-180 except for the final two feet which will be compacted to at least 95% of the maximum dry density at +/- 2% of optimum moisture content as determined by AASHTO T-180. Compacted backfill is required for the full depth of the trench above bedding in the following locations:

1. Beneath driveways, parking areas, roads, recreational pathways or other construction or structures

2. In driveway and parking area shoulders

3. Beneath fills or embankments

Flowable concrete backfill is an acceptable alternative.

27.2.3.6: Culverts

This section covers corrugated steel, high density polyethylene, or approved equal pipe, used for minimum eighteen-inch storm drains beneath roads. Culvert sizing shall be in accordance with Section 27.1.3.3.D. Corrugated steel, high density polyethylene, or approved equal pipe shall be furnished and installed with all jointing materials, accessories, and appurtenances as indicated on the drawings and as specified.

A. Materials: Materials used for storm drains shall conform to the applicable AASHTO provisions of the "Standard Specifications for Highway Materials."

1. Circular Pipe: Corrugated steel pipe shall be AASHTO M36-78 and galvanized with 2-2/3" x ½" corrugations. The corrugations may be annular or spiral with annular ends. High density polyethylene pipe shall be approved by the Engineering Department.

2. Coupling Bands: All field joints in storm drains will be made the pipe manufacturer's standard coupling band type.

3. End Sections: Flared end sections shall be provided on all culverts unless otherwise specified by the County Engineer. The end sections shall be of the same material as the culvert and provided with a rolled reinforced edge. The end sections for corrugated steel pipe shall be fabricated from 16 gauge-galvanized sheet metal for 24-inch diameter and smaller pipe and 12 gauge galvanized sheet metal for 36-inch diameter and larger pipe.

B. Handling: Pipe, couplings, and accessories will be handled in a manner that will ensure installation in sound, undamaged condition. Equipment, tools, and methods used in unloading, reloading, hauling, and laying pipe will be such that the pipe is not damaged.

C. Cleaning: The interior of the pipe and any couplings shall be thoroughly cleaned of all foreign matter before being installed. Before jointing all joint contact surfaces shall be wire-brushed, if necessary, wiped clean, and kept clean until jointing is completed.

D. Installation:

1. Installation Requirements: Storm drains shall be laid true to the grade required by the drawings and shall be installed in accordance with the following requirements:

    a. Pipe: The pipe shall be installed in accordance with the details indicated on Figures 27-17 and 27-18 and the applicable portions of the excavation section. The pipe shall be protected from lateral displacement by means of a pipe embedding material as specified for trench backfill. The minimum cover for culvert pipe is 12 inches.

    b. Couplings: Sections of the pipe shall be joined together using the manufacturer's standard coupling bands, centered on the joint, and with the pipe sections as close together as possible. Each coupling band shall be fastened in placed and tightened sufficiently to ensure a tight joint and to form a continuous conduit capable of resisting all stresses. Pipe shall not be laid in water or under unsuitable weather or trench conditions.

    c. End Sections: The end sections shall be attached to the culvert by threaded rod and connecting lug.

    d. Riprap: Culverts shall have a riprap bed of 10 feet in length by 10 feet in width or the width of the ditch, which ever is less, at the inlet and outlet for erosion control. The riprap shall consist of hard, dense, sound, rough fractured rock as nearly cubic as practical. Pit run or dredge rock can be substituted. Each rock shall have a minimum volume of 0.25 cubic feet (approximately 30 pounds) per stone. Slab type and flaking rocks shall not be used.

2. Use of Culverts at Access Point to Roads: Driveway, road, or recreational pathway connections to a County road or recreational pathway shall not be constructed in such a way as to impede the normal flow of drainage in roadside ditches, culverts, under drains, bridges, or other drainage works or to cause such drainage to flow onto or across the driving surface of a County road. In the event that such an impediment results in damage to a County road, the Road and Bridge Department will remove the impediment and bill the property owner for the costs of repairs to the road including labor, equipment, and material.

    In certain instances a culvert may not be required by virtue of the topography. In that event, a written waiver must be obtained from the Road & Bridge Department. Such a waiver does not constitute a waiver of the permit fee, inspection, or any other requirement of the access.

27.2.3.7: Subgrade

The bottom of the excavation or top of the fill is considered the subgrade, and shall conform to the lines, grades, and cross sections shown on the plans.

A. Subgrade Specifications: Soft, spongy or frozen subgrade shall be removed as directed and replaced with suitable granular material placed and compacted as specified in Section 27.2.3.4.

B. Compaction: Before subbase construction begins, soils in the subgrade shall be compacted to at least 90% of the maximum dry density as determined by AASHTO Method T-180 and the moisture content must be no more than 3% of the "Standard Optimum".

27.2.3.8: Gravel Roads

Gravel roads shall consist of a compacted subbase of thickness according to design and a 6" compacted base course.

A. Gravel Specifications: Gravel used in road construction shall be crushed to the required size and a filler of crusher fines or other finely divided mineral matter must be used. The portion of material retained on a No. 4 sieve is considered filler. At least 50% by weight of the course aggregate particles shall be particles having at least two fractured faces. The gravel shall be screened if necessary to meet this requirement or to eliminate an excess of filler. The composite base course material and subbase course shall be free from organic matter, snow, ice or other deleterious materials and meet the grading requirements in Table 27-13.

B. Compaction of Subbase or Base Course (Gravel Roads): The subbase or base course shall be placed and spread in a uniform layer and without segregation of size to a depth not exceeding eight inches of un-compacted material. The material will be compacted to at least 95% of the maximum dry density at +/- 2% of optimum moisture content as determined by AASHTO T-180.

C. Manholes: On gravel roads where manholes or water valve boxes are located in the roadway, they must have a minimum of five inches of cover at finished grade.

D. Dust Abatement: The County may require an appropriate dust abatement material be applied to gravel roads as deemed necessary by the County Engineer, the Road and Bridge Department, or authorized representative, or as required by State or local air quality regulations.

27.2.3.9: Asphalt Paved Roads

Hot Mix Asphalt (HMA) pavements shall be designed, installed, constructed, maintained, and repaired in accordance with these standards and specifications and with the latest edition of The Colorado Department of Transportation Standard Specifications for Road and Bridge Construction. In the event of discrepancies between these standards and the Colorado Department of Transportation Standard Specifications for Road and Bridge Construction, the more stringent of the two shall take precedence over the other.

A. Aggregate Base Course:

1. Aggregate Base Course Specifications:

   Aggregate for bases shall be crushed stone, crushed slag, crushed gravel, natural gravel, or crushed reclaimed concrete or asphalt material which conforms to the quality requirements of AASHTO M 147, except that the requirements for the ratio of minus No. 200 sieve fraction to the minus No. 40 sieve fraction, stated in 2.2.2 of AASHTO M 147, shall not apply.

   Aggregate for bases shall be free from organic and frozen matter, lumps or balls of clay.

   Aggregate for bases shall meet the specifications shown in Table 27-14 for Class 5 or Class 6 Aggregate Base Course, and shall have a liquid limit of no greater than 30 and a plasticity index of no greater than 6 when the aggregate is tested in accordance with AASHTO T-89 and T-90, respectively.

   Aggregates for bases, when tested in accordance with AASHTO T-96, shall have no more than 50% wear.

   The use of mine waste or other potentially environmentally hazardous materials as aggregate base course material, without the prior review and approval of the County Engineer is prohibited. The Applicant or contractor must identify the source of aggregate base course material to the County Engineer prior to incorporation of such material into the project. The County may require analysis and testing of material proposed to be utilized as aggregate base course material for heavy metals, and other environmentally damaging substances prior to incorporation of the material into the project. If Inspection discloses the unapproved use of mine wastes or other potentially environmentally damaging

substances as aggregate base course, the County, at the discretion of the County Engineer, may withhold the granting of any further permits or approvals to the Applicant or contractor for the project until at such time as the Applicant or contractor has completed the necessary corrective work.

B. Compaction of Aggregate Base Course (Asphalt Roads): Placement of aggregate base course material shall conform to the lines, grades, cross-sections, the thickness shown on the approved plans, and when placed and compacted, it shall result in a firm, dense, unyielding foundation.

Aggregate base course material shall not be placed upon a soft, spongy, frozen subgrade.

Aggregate base course material shall be deposited and spread without particle segregation in loose layers not to exceed six inches in depth when compacted. If the required compacted depth of the aggregate base course exceeds six inches, it shall be constructed in two or more layers of approximately equal thickness.

The material shall be compacted to at least 95% of the maximum dry density at +/- 2% of optimum moisture content as determined by AASHTO T-180.

The surface of each layer shall be maintained during the compaction operations so that a uniform texture is produced and the aggregates are firmly keyed. Water shall be uniformly applied during compaction, in the quantity necessary for proper compaction.

C. Hot Mix Asphalt (HMA) Pavement: This work consists of one or more courses of Hot Mix Asphalt (HMA) laid upon a prepared base in accordance with these specifications, and in conformity to the finished lines, grades and thickness' shown on Figures 27-1 through 27-6, and on the approved plans.

Hot Mix Asphalt (HMA) pavement shall be composed of a mixture of aggregate, filler or additives if required and approved, bituminous material, and reclaimed material if permitted and used.

Hot Mix Asphalt (HMA) Mix Design: Hot Mix Asphalt (HMA) pavements shall be designed in accordance with the latest editions of the Colorado Department of Transportation Pavement Design Manual and Standard Specifications for Road and Bridge Construction, utilizing the Superpave system.
Hot Mix Asphalt (HMA) mix designs shall be prepared by a registered Colorado Professional Engineer with expertise in the design of Hot Mix Asphalt (HMA) pavements.

The Hot Mix Asphalt (HMA) mix design shall include a job mix formula for each mixture proposed to be used on the project. The job mix formula for each mixture shall establish a single percentage of aggregate passing each required sieve size, a single percentage of bituminous material to be added to the aggregate, and a single temperature for the mixture at the discharge point of the plant. After the job mix formula is established, all mixtures furnished for the project shall conform to the following ranges of tolerances:

Bitumen	± 0.3%
Asphalt Recycling Agent	± 0.2%
Temperature of mixture when emptied from mixer	± 20° F
Passing 3/8 inch and larger sieves	± 6%
Passing No. 4 and No. 8 sieves	± 5%
Passing No. 30 sieve	± 4%
Passing No. 200 sieve	± 2%

The County Engineer or designated representative must approve any proposed Hot Mix Asphalt (HMA) mix designs, prior to placement of Hot Mix Asphalt (HMA) pavement.

1. Materials to be Used:

    a. Aggregate for Hot Mix Asphalt (HMA) Pavements: The aggregates for Hot Mix Asphalt (HMA) pavements shall be of uniform quality, composed of clean, hard, durable particles of crushed stone, crushed gravel, natural gravel, or crushed slag. Aggregates for Hot Mix Asphalt (HMA) pavements shall comply with the gradations specified in Table 27-15, and shall not contain clay balls, vegetable matter, snow, ice or other deleterious materials. These additional Form 43 screens will initially be established for the contractor's quality control testing using values from the as used gradation shown on the mix design.

    Of the particles retained on the No. 4 sieve, at least 80% by weight shall have at least two fractured faces.

    The crushed gravel, when tested in accordance with AASHTO Standard Test Designation T-96, shall have no more than 45% wear and shall show no detrimental amount of stripping when tested.

    Determination of the effect of water on the cohesion (stripping resistance) of Hot Mix Asphalt (HMA) Hot Mix Asphalt (HMA) composed of the proposed mineral aggregates shall be made in conformance with AASHTO Standard Test Designation T-165-77 with a minimum dry strength of 200 psi with a minimum retained strength of 75% of the dry strength.

    b. Asphalt Cement: Superpave_performance graded binders shall conform to the specifications in Table 27-16 of these standards and specifications.

2. Sampling and Testing: All sampling and testing, of materials incorporated into the Hot Mix Asphalt (HMA) mixture, shall be performed in accordance with the latest AASHTO Materials Testing and Sampling Manual, and the latest editions of the Colorado Department of Transportation, Field Materials Manual and Lab Manual of Test Procedures. The County Engineer shall be supplied with Certificates of Compliance or test reports, for all materials incorporated into the Hot Mix Asphalt (HMA) mixture, by a Colorado Registered Professional Engineer with expertise in the sampling and testing of Hot Mix Asphalt (HMA) materials, before any asphalt is placed.

3. Construction of Hot Mix Asphalt (HMA) Pavements: The construction of Hot Mix Asphalt (HMA) pavements shall be in accordance with these standards and specifications and with the latest edition of The Colorado Department of Transportation Standard Specifications for Road and Bridge Construction. In the event of discrepancies between these standards and specifications and the Colorado Department of Transportation Standard Specifications for Road and Bridge Construction, the more stringent of the two shall take precedence over the other.

    a. General Conditions: Hot Mix Asphalt (HMA) shall be placed only on properly constructed and accepted surfaces that are free from water, snow and ice.

    The Hot Mix Asphalt (HMA) mixture shall be placed within the air temperature limitations as shown in Table 27-18 and only when weather conditions otherwise permit the pavement to the properly placed and finished.

    The top lift of Hot Mix Asphalt (HMA) pavement shall not be placed between October 1st and April 1st unless otherwise approved by the County Engineer or the Road and Bridge Director. This approval will not waive the above table or any other specifications.

    When it is in the public's best interest and approved by the County Engineer or the Road and Bridge Department, the following shall apply:

i. Minimum temperature requirements may be waived for prime coats and layers of Hot Mix Asphalt (HMA) below the top layer of the completed pavement. However pavement operations will be suspended when density requirements are not met.

ii. The Road & Bridge Superintendent and/or County Engineer shall have the authority to delay paving if it is their opinion the road subgrade may continue to have structural problems such as settling. The delay will be through one winter and spring season. The road will again be inspected in the early summer. At that time, the following will occur:

- Repair of any subgrade problems that may have occurred.
- A decision to allow paving to occur or the delay of possible paving until the next year.

A financial guarantee for paving will be in place until such time that paving occurs. After paving, a financial guarantee shall be in place to warranty the structural integrity of the road.

b. Pavement Thickness: When Hot Mix Asphalt (HMA) pavement thicknesses in excess of 3 inches are called for, they shall be laid in separate courses of not less than 2 inches or more than 3 inches. The thicknesses called for are finished thicknesses after compaction.

c. Hot Mix Asphalt (HMA) Mixing Plants: Hot Mix Asphalt (HMA) mixing plants shall be capable of producing a uniform mixture, have adequate capacity and be maintained in good mechanical Condition.

Dust, smoke or other contaminates shall be controlled at the plant site to meet all air quality requirements in accordance with the "Colorado Air Quality Act", Title 25, Article 7, CRS and regulations promulgated there under.

Hot Mix Asphalt (HMA) plant mix shall not be stored longer than nine hours, unless additional protective measures are used and approved.

4. Hauling Equipment: Trucks used for hauling Hot Mix Asphalt (HMA) mixtures shall have tight, clean smooth metal beds thinly coated with a minimum amount of paraffin oil, lime solution or other approved release agent. Petroleum distillates such as kerosene or fuel oil will not be permitted. Each truck shall have a cover or canvas or other suitable material to protect the mixture from the weather.

5. Hot Mix Asphalt (HMA) Pavers: Self-propelled Hot Mix Asphalt (HMA) pavers shall be provided and equipped with an activated screed assembly, heated if necessary, capable of spreading and finishing the Hot Mix Asphalt (HMA) material in lane widths applicable to the typical section and thickness shown on the approved plans and the figures contained in these standards and specifications. Pavers used for shoulder and recreational pathway construction shall be capable of spreading and finishing courses of Hot Mix Asphalt (HMA) plant mix material in the width and thickness shown on the approved plans and figure contained in these standards and specifications.

The paver's receiving hopper shall have sufficient capacity for a uniform spreading operation and shall have an automatic distribution system that will place the mixture uniformly in front of the screed.

The screed or strike-off assembly shall produce the specified finish surface without tearing, shoving or grouping the mixture.

Pavers shall be equipped with automatic screed controls with sensors capable of sensing grade from an outside reference line and maintaining the screed at the specified longitudinal grade and transverse

slope. The sensor shall be constructed to operate from either or both sides of the paver and shall be capable of working with the following devices:

a. Ski-type device at least 30 ft. in length

b. Short ski or short shoe

c. At least 5000 ft of control line and stakes

The controls shall be capable of maintaining the screed at the specified transverse slope within plus or minus 0.1 percent.

Manual operation will only be permitted for constructing irregular shapes and minor areas. In addition, if the automatic controls fail or malfunction, the equipment may be operated manually for the remainder of the normal working day provided specified results are maintained.

If the contractor/Applicant fails to obtain and maintain the specified surface tolerances, the paving operation shall be suspended until satisfactory corrections, repairs or equipment replacements are made.

D. Surface Conditioning: Irregularities in the existing pavement or base shall be brought to uniform grade and cross-section.

Prior to placing tack coat and beginning the overlay work, all surfaces to be tack coated shall be swept to remove accumulations of loose gravel and debris. Tack coat will be required between all pavement courses. Tack coat or other types of bituminous material as specified, shall be placed on the contact surfaces of curbs, gutters, headers, manholes, etc., prior to the placement of Hot Mix Asphalt (HMA) against them.

E. Spreading and Finishing: The minimum temperature of the mixture when discharged from the mixer and then delivered for use shall be as shown in table 27-17:

The Hot Mix Asphalt (HMA) mixture shall be transported and placed on the roadway without segregation. All segregated areas behind the paver shall be removed immediately upon discovery. The segregated material shall be replaced with material that meets specifications before the initial rolling has taken place. Immediately after the course is screened and before roller compaction is started, the surface shall be checked, any inequalities adjusted, all fat sandy accumulation from the screen removed by a rake or hoe and all fat spots removed and replaced with satisfactory material. Irregularities in alignment and grade along the outside edge shall also be corrected by the addition or removal of mixture before the edge is rolled. Special attention shall be given to the straightening of each course immediately following the initial rolling

F. Compaction: The Hot Mix Asphalt (HMA) pavement shall be compacted by rolling. Both steel wheel and pneumatic tire rollers will be required. The number, weight, and type of rollers furnished shall be sufficient to obtain the required density while the mixture is in a workable condition. Compaction shall begin immediately after the mixture is placed and be continuous until the required density is obtained. When the mixture contains unmodified asphalt cement (PG 58-28, PG 58-22, or PG 64-22) and the surface temperature falls below 185° F, no further compaction effort will be permitted unless approved. If the mixture contains modified asphalt cement (AC-20R, or PG 64-28) and the surface temperature falls below 230° F no further compaction effort will be permitted unless approved.

Final compaction shall result in a course that is smooth and true to the established crown and grade. It shall have the average thickness specified and shall at no point vary more than ¼ inch from the thickness specified. All roller marks shall be removed with the finish rolling. Use of vibratory rollers with the vibrator on will not be permitted on final rolling.

The surface of the finished pavement shall be free from depressions exceeding 3/16 inch in ten feet as measured by a ten-foot straight edge measured in any direction or an automobile mounted recording profilometer.

The asphalt concrete pavement shall be compacted to a density of 92% to 96% of the maximum theoretical density, as determined according to Colorado Procedure 51. Field density determinations will be made in accordance with Colorado Department of Transportation Procedure #44 and #81

Along forms, headers, curbs, walls and all other places not accessible to the rollers, the mixture shall be thoroughly compacted with mechanical tampers.

Any mixture that becomes loose and broken, mixed with dirt, or in any way defective, shall be removed and replaced with fresh hot mixture, which shall be compacted to conform to the surrounding area.

G. Joints: Longitudinal and transverse joints shall be well bonded and sealed. Joints shall be painted with cutback asphaltic cement where necessary to obtain this result. In making the joint along any adjoining edges such as curb, gutter or an adjoining pavement and after the hot mixture has been placed by the finishing machine, just enough of the hot material shall be carried back to fill any space left open. The joint shall be properly set up with the back of a rake at proper height and level to receive the maximum compression under rolling.

Joints between old and new pavements or between successive days work shall result in a thorough and continuous bond between the old and new surfaces. The edge of the previously laid course shall be cut back to its full depth to expose a fresh surface, after which the hot mixture shall be placed against it and raked to a proper depth and grade. Hot smothers or tampers shall be used to heat the previously laid pavement (without burning it) to ensure a proper bond.

H. Drainage Pans: Drainage pans may be used where approved by the County Engineer. Pans should be used exclusively for the use of drainage and not for speed control dips. The drainage pan design shall conform to the design as shown in Figure 27-19.

27.3: ACCESS PERMIT REQUIREMENTS

27.3.1: Purpose and Intent

Access permits must be obtained whenever an Applicant, contractor, property owner, or other individual proposes to connect a driveway to an existing public or private roadway or recreational pathway in unincorporated Archuleta County. The reason for requiring access permits is to insure the design of the connection meets the specifications in these regulations and allows for proper drainage. Access permits are also intended to assure adequate reconstruction and/or repair of any damage caused to the County road right-of-way, or recreational pathway easement, roadway or recreational pathway during construction of the connection. Access permits shall be obtained before building permits may be issued and must be obtained at least seven (7) days prior to the commencement of construction. Any permit issued shall pertain only to the county-owned right-of-way and is in no way to be considered a permit to enter on any private property adjacent to such right-of-way, nor to alter or disturb any facilities or installation existing within the right-of-way and which may have been installed and are owned by others. Permits, when issued, shall be valid for a period of 365 days and may be renewed provided renewal is obtained prior to the expiration date of the permit.

27.3.2: Bonds

Before undertaking any excavation within a County road right-of-way, or recreational pathway easement, a non-cancelable permit bond issued by an approved corporate surety licensed to do business in the State of Colorado, in the amount of $10,000 or an amount equal to that required to restore the right-of-way, as determined by the County Engineer, whichever is greater, payable to the County, shall be required in the name of the permittee prior to the issuance of an access permit. Such bond shall ensure that the permittee will comply with all county standards and specifications and shall ensure recovery by the county of any expenses incurred, within a period of 730 days, following the expiration of the permit, to the amount of the bond, due to failure of the permittee to comply with the

provisions of these standards and specifications, or to otherwise cause expense to the county as a result of the work performed. Any permit determined to be without an adequate bond, as required in these standards and specifications, shall be subject to immediate revocation by the County Road & Bridge Department.

27.3.3: Procedures/Requirements for Issuance of Permits to Access the Right-of-Way

The following procedures must be followed and requirements met in the review of applications for access permits.

27.3.3.1: Submittal Requirements for Permits to Access the Right-of-Way

The following information must be submitted with any application for an access permit, unless specific items are waived by the Engineering Department as unnecessary.

A. Fee as required by resolution of the Board of County Commissioners.

B. Completed permit form.

C. Site plan showing the following information:

1. Well location, if any
2. Existing structures, if any
3. Proposed structures including any garages
4. Location of property lines
5. Location of required setbacks and their dimensions
6. Location of easements, if any
7. Location of proposed driveways and their grades
8. Location of any parking area proposed in lieu of meeting required driveway grades (applicable to single family and duplex units only; see Section 27.1.7.4.F)
9. Access point to County roadway
10. Location of drainage culvert, if applicable

D. Evidence of legal access

27.3.3.2: Action on Permits to Access the Right-of-Way

Applications for permits to access the right-of-way shall be submitted to the Road & Bridge Department for review and action. Approval shall be granted only if the proposed driveway, roadway or recreational pathway connection meets the specifications in these regulations, the necessary bond is posted and the required fee has been paid. Approval of a permit to access the right-of-way may be accompanied by any conditions deemed reasonable by the Road & Bridge Department to insure protection of health, safety and welfare and compliance with these regulations. Applications for permits to access the right-of-way must be submitted at least seven days prior to planned commencement of construction, and construction cannot commence without permit approval. Whenever a permit to access the right-of-way is needed for a development project, building permits shall not be issued for the project until approval is granted for the needed permit to access the right-of-way.

27.3.3.3: Construction Specification for Access Work

All work undertaken to connect driveways to existing County roadways shall conform to the Road and Bridge Design Standards and Construction Specifications contained in these regulations.

27.3.3.4: Construction Schedule for Access Work

As part of its approval of any access permit, the Road & Bridge Department shall also approve a construction schedule. The approved schedule shall not be changed after the permit is issued without the written consent of the Road & Bridge Department.

27.3.4: Supervision of Access Work

The permittee shall at all times conduct work within the County right-of-way, or recreational pathway easement so as to avoid obstruction and hazard to the traveling public. Materials necessary for construction of access points to the County roadway shall not be stored in the County right-of-way, or recreational pathway easement at any time. The roadway and roadside area where access work has been performed shall be thoroughly cleared of all debris and extraneous material and shall be restored to a condition equal to or better than the original when construction is concluded.

27.3.5: Inspection and Testing of Access Work

Inspections of the work shall be in accordance with Section 27.2.3.2, B and C.

It is the responsibility of the permitee to contact the Road & Bridge Department 48 hours in advance of required inspections.

A final inspection at the conclusion of construction is required. In making this inspection, the Road & Bridge Department shall check for compliance with these regulations and approved plans, and also for adequate cleanup of roadway or recreational pathway surfaces and the right-of-way, or recreational pathway easement. Certificates of occupancy shall not be issued by the Building Department until access work is determined to be satisfactory by the Road & Bridge Department.

Any work or material which does not conform to these regulations, any pavement failures or broken asphalt, damaged signs or fencing, and remaining debris either in the roadway or adjacent property, or improper drainage shall be brought to the attention of the permittee and shall be corrected by the permittee. Any work in which untested or unaccepted materials are used shall be ordered removed and replaced at the permittee's expense. Any required corrective work shall be made at the permittee's expense and shall be done to the satisfaction of the Road & Bridge and Engineering Departments.

Any party who, without first having obtained an access permit and/or who, having made a cut in a public right-of-way or recreational pathway easement which has settled, has failed or which has not been repaired in conformance with established county standards and specifications, shall be subject to a stop work order issued by the Road & Bridge Department, whereupon such party shall, except in emergency situations, discontinue all work within the public right-of-way or recreational pathway easement until such time as the required repair has been satisfactorily completed and no further permits will be issued until the repair has been made or the county reimbursed for its expenses.

The County may, on its own initiative, make required repairs and bill the responsible party. Such charges shall include, but not necessarily be limited to, costs for labor, materials, equipment on a portal to portal basis, administrative staff time and, if applicable, reasonable attorney's fees incurred by the County.

In determining whether or not the access work done by the permittee is acceptable, the Road & Bridge Department may consult with the Engineering Department. If a determination is made that testing is required, the number and location of the tests shall be determined by the Engineering Department. If the Engineering Department determines testing by an independent lab is necessary, the cost of such testing shall be paid by the permittee.

27.3.6: Responsibility for Rework on Access Connections

The permittee shall be fully responsible for the maintenance and correction of any faulty construction, including unstable road cuts and chuckholes developed during the construction period and for a period of two years following the final inspection of the access work. All deficiencies shall be resolved to the satisfaction of the Engineering Department.

27.4: OTHER WORK WITHIN THE RIGHT-OF-WAY REQUIREMENTS

27.4.1: Purpose and Intent

All work performed in a public right-of-way, including a recreational pathway, shall require the issuance of a right-of-way permit prior to the commencement of construction. Right-of-way permits are required to assure the method of installation meets the specifications in these regulations, and adequate revegetation of disturbed areas outside the roadway is done. They are also intended to assure adequate reconstruction and/or repair of any damage caused to County roads, road right-of-way, or recreational pathway easement. Right-of-way permits must be obtained at least seven (7) days prior to the commencement of construction within a public right-of-way and are issued by the Road & Bridge Department. Any permit issued shall pertain only to the county-owned right-of-way and is in no way to be considered a permit to enter on any private property adjacent to such right-of-way, nor to alter or disturb any facilities or installation existing within the right-of-way and which may have been installed and are owned by others. Permits, when issued, shall be valid for a period of 365 days and may be renewed provided renewal is obtained prior to the expiration date of the permit.

27.4.2: Requirements for Financial Guarantee

Before undertaking any excavation within a County road right-of-way, or recreational pathway easement, a non-cancelable permit bond issued by an approved corporate surety licensed to do business in the State of Colorado, in the amount of $10,000 or an amount equal to that required to restore the right-of-way, as determined by the County Engineer, whichever is greater, payable to the County, shall be required in the name of the permittee prior to the issuance of an access permit. Such bond shall ensure that the permittee will comply with all county standards and specifications and shall ensure recovery by the county of any expenses incurred, within a period of 730 days, following the expiration of the permit, to the amount of the bond, due to failure of the permittee to comply with the provisions of these standards and specifications, or to otherwise cause expense to the county as a result of the work performed. Any permit determined to be without an adequate bond, as required in these standards and specifications, shall be subject to immediate revocation by the County Road & Bridge Department.

27.4.3: Procedures/Requirements for Issuance of Right-of-Way Permits

The following procedures must be followed and requirements met in the review of applications for right-of-way permits.

27.4.3.1: Submittal Requirements for Right-of-Way Permits

The following information must be submitted with any application for a right-of-way permit, unless specific items are waived by the Road and Bridge Department or his authorized representative as unnecessary.

A. Fee as required by resolution of the Board of County Commissioners

B. Completed permit form

C. For minor installations, sketch plan showing the following:

   1. Location of all excavations using dashed lines

2. Location of road and road right-of-way, or recreational pathway easement

3. Location of any driveways

4. Existing structures, if any

5. Proposed structures including any garages

D. For major installations, construction plans and specifications

E. Construction schedule

F. Surety bond as required by this section.

27.4.3.2: Action on Right-of-Way Permits

Applications for right-of-way permits shall be submitted at least three days prior to planned commencement of construction for minor installations and five days prior for major installations. Construction cannot commence without permit approval and posting of the necessary permit bond. The Road & Bridge Department is responsible for review of applications for right-of-way permits. Consideration shall be given to how the proposed installation affects County road or recreational pathway maintenance and improvement programs. Right-of-way permits shall not be issued any earlier than May 1st of each year and all right-of-way permit work shall be completed by October 31st of each year. These dates may be changed by the Road and Bridge Department or authorized representative for good cause so long as the quality of work is not adversely affected.

Approval shall be granted only if the proposed installation meets the standards and specifications in these regulations, the required fee has been paid, and the permit bond has been posted if required. Approval of a right-of-way permit may be accompanied by any conditions deemed reasonable by the Road & Bridge Department to insure protection of health, safety, and welfare and compliance with these regulations.

The right-of-way permit must be signed by the Road and Bridge Department or authorized representative or his agent for it to be approved. Whenever a permit to access the right-of-way is needed in conjunction with right-of-way, or recreational pathway easement work, the right-of-way permit shall not be issued unless approval is granted for the needed access permit.

27.4.3.3: Construction Specifications and Schedule for Right-of-way, or Recreational Pathway Easement Work

All work undertaken to install utilities or culverts within the County road right-of-way or recreational pathway easement shall conform to the requirements contained in these regulations, and to approved plans and specifications. In issuing right-of-way permits, the Road & Bridge Department shall also approve a construction schedule. The approved construction plans, specifications, and schedule cannot be changed without the written consent of the Road and Bridge Department or authorized representative, except in emergency situations as provided in Section 27.4.3.4.

27.4.3.4: Emergencies

If a true emergency exists where time is not available to follow the procedures for obtaining a right-of-way permit or for making modifications to the approved plans, specifications, and schedule, an excavator may proceed with right-of-way, or recreational pathway easement work after obtaining verbal approval from the Road & Bridge Department. Under no circumstances shall any backfill be placed without obtaining a written permit approval.

27.4.3.5: Expiration of Permits

Utility permits expire when the end of the approved construction schedule is reached, and must be renewed in

advance to prevent the County from calling any bond or financial guarantee posted by the permittee.

27.4.4: Procedures for Road or Recreational Pathway Closures During Right-of-way, or Recreational Pathway Easement Work

Road or recreational pathway closures to accommodate right-of-way, or recreational pathway easement work are not permitted unless justified on the basis of overall benefit to the general public. Refer to Section 27.2.2 for specific requirements to road or recreational pathway closures. Requests for road or recreational pathway closures shall be specified on the permit form submitted by the applicant, and no road or recreational pathway closures shall be undertaken unless approved as part of the right-of-way permit issued by the Road & Bridge Department. When road or recreational pathway closures have been approved, the permittee shall use the following procedures:

27.4.4.1: Submittal of Plans and Schedule for Closures

At least five days prior to actual closure, the permittee shall obtain approval from the Road & Bridge Department for a detailed traffic control plan. This plan must be based on the Colorado Department of Transportation "S" Standards and in compliance with Section VI of the Manual of Uniform Traffic Control Devices. In addition, at least five days prior to actual closure, the permittee shall verify the schedule and location of road or recreational pathway closures.

27.4.4.2: Notification of Closures

At least five days prior to actual closure, the permittee shall notify the appropriate fire district, health services district, school district, and the County Sheriff's office of the exact location, date and time traffic will be impeded.

27.4.4.3: Time of Closures; Detours

Road or recreational pathway closures are only permitted between the hours of 7:30 a.m. and 5:30 p.m. unless authorized otherwise by the Road & Bridge Department. Where closures of more than one day are approved, a suitable detour must be provided, and must be marked and signed to accommodate night traffic.

27.4.5: Protection of Public Safety and Convenience

The permittee shall at all times conduct right-of-way, or recreational pathway easement work to ensure the least possible obstruction and hazard to the traveling public. The permittee shall provide for the safety and convenience of the residents along roads or recreational pathway where work is being done, and for the protection of persons and property at all times. Adequate warning signs, barricades, lighting, flags and other devices as specified in the Manual on Uniform Traffic Control Devices Part VI and the Colorado Department of Transportation "S" Standards, and, as approved by the Road & Bridge Department and Engineering Department, shall be provided, maintained, and paid for by the permittee. Flagmen shall be posted to guide the traveling public where only one traffic lane remains open, or through otherwise unsafe operations. Prior to approval of the right-of-way permit, a traffic control plan shall be submitted to the Road and Bridge Department for approval.

27.4.6: Construction Procedures for Right-of-way, or Recreational Pathway Easement Work

The permittee shall plan right-of-way or recreational pathway easement work so it does not create safety hazards or maintenance problems, render portions of right-of-way, or recreational pathway easement unusable for future road improvement, or obstruct major floodways.

27.4.6.1: Compliance with Safety Standards

The permittee's operations shall conform to the applicable requirements established by the Federal Occupational Safety and Health Act (OSHA).

27.4.6.2: Staging of Installations

Staging of utility installations may be required by the Road & Bridge Department to produce the least disruption possible for the traveling public. Permission to proceed for any subsequent stages may not be issued until the prior stage has satisfactorily progressed or been completed.

27.4.6.3: Installation of Utilities

All utilities installed through county-owned property shall be installed in accordance with the plans and specifications approved by the utility owner and the Road and Bridge Department or its authorized representative. Where applicable, the plans for installation must bear the name, seal and signature of a registered professional engineer, proficient in the design of the utility being installed, responsible for their preparation. The alignment of all utilities within County rights-of-way and major floodways is subject to approval by the Road and Bridge Department or authorized representative.

A. Underground Utilities: Wherever possible accesses to underground utilities shall not be within the road surface (e.g. manholes, vaults). Where necessary these accesses shall be of heavy-duty construction capable of safely supporting anticipated maintenance equipment and vehicular traffic. The top of these accesses shall be 1-inch below the finished grade, and be at the same slope as the road.

   Seep plugs shall be installed in trenches used for underground utilities at no less than 500 foot intervals if the possibility exists that the surrounding water table will be lowered and this will have an adverse effect on surrounding wells and vegetation dependent on the water table elevation.

   Underground utilities, including but not limited to, electric lines, telephone lines, gas lines, cable television/ broadband internet service lines, sanitary sewer service lines, water service lines or any other type of utility, shall be installed to the depth specified in the approved plans and specifications for the utility installation, or to a depth of not less than 2 ft. which ever is greater, when such work is located within the public right-of-way. All underground utilities shall be marked such that they can be located.

B. Aboveground Utilities: All aboveground utilities through County-owned property shall be located and installed so they do not cause unnecessary obstruction to pedestrian and vehicular traffic or damage to the utilities themselves that could be harmful to the general public. The minimum overhead clearance shall be 18 feet. No pole or structure above ground shall be placed within a pedestrian walkway nor set closer than ten feet to the shoulder of any County road (see Section 27.1.6.4). In no case will a pole be permitted within ten feet of the travel lane shoulder of a County road except light and traffic control poles with breakaway bases.

C. Utilities in Major Floodways: All utilities within or adjacent to major floodways shall comply with the Archuleta County Floodplain Regulations, and shall be located and installed in a manner that will prevent objectionable damage such as land erosion, water pollution or flood diversions.

27.4.6.4: Trenching, Backfill and Reconstruction of Road or Recreational Pathway Surfaces

The method used in trenching for underground utilities and for backfilling trenches shall comply with the requirements of these regulations (Section 27.2.3.5). Jetting of backfill is not permitted within County roadways or recreational pathways. Upon completion of installation, the roadway or recreational pathway shall be reconstructed using the specifications contained in these regulations for subbase preparation, base course materials, thickness and compaction, and final surfacing so as to restore the roadway to design standards construction specifications for that type of road or recreational pathway and compaction reports supplied to the Road & Bridge Department. Flowable fill may be used in lieu of obtaining compaction reports.

A. Gravel Roads: Suitable material excavated from trenches may be used for backfill subject to approval of the Road & Bridge Department. At no time shall contaminated, wet, soggy, frozen or other unsuitable material be used as backfill. If proper backfill is not available at the site, suitable material shall be imported and unsuitable material removed from the site. Backfill shall extend to the subgrade of the road or to natural ground (see

Figure 27-15).

B. Paved Roads or recreational pathways: All cuts made in asphalt or concrete surfacing shall be made by mechanically cutting a horizontal and vertical line and shall be cut one foot wider than the edges of the trench or the damaged area (see Figure 27-16).

All excavations made in paved roads or recreational pathways shall be completely restored within fifteen days after acceptance of the backfill by the Road & Bridge Department. In the event weather conditions preclude restoration by permanent hot bituminous pavement, temporary repairs may be made by tamping and rolling into place cold mix asphalt. Such cold mix patches shall be removed and replaced by a permanent hot bituminous pavement within thirty days or as weather and availability of materials permit.

The final pavement cut shall not be made until immediately prior to patching.

Permanent hot mix patches shall be no less than three inches in thickness or not less than the thickness of the pavement adjacent to the excavation, whichever is thicker.

Permanent patches shall be installed in accordance with Section 27.2.3.9 and with the following construction methods:

1. When a utility patch is located within a single roadway lane, the existing asphalt shall be cut from centerline of the road, transversely to the outside edge of asphalt of the lane containing the utility patch, and replaced with Hot Mix Asphalt (HMA) of the type specified in the approved plans and specifications.

2. When a utility patch is located within two roadway lanes, the existing asphalt shall be cut from edge of asphalt of lane 1, transversely across the roadway, to the edge of asphalt of lane 2, and replaced with Hot Mix Asphalt (HMA) of the type specified in the approved plans and specifications.

3. Infrared pavement patching may be substituted as an approved alternate construction method for 1 and 2 above. However, infrared pavement patching will be required for all pavement patches on recreational pathways and when the existing asphalt is less than 3 years old.

Damaged pavement shall be repaired by appropriate methods as approved by the Road & Bridge Department. In general, cracks shall be filled with the proper asphalt hot bituminous pavement product and the surface seal-coated. An overlay, the full width of the paved surface, shall be required in those instances where, in the opinion of the Road and Bridge Department or authorized representative, riding quality, safety or appearance of the finished roadway or recreational pathway has been impaired. Subgrade failures caused by the permittee's operation of heavy equipment shall be rectified by reconstructing the subgrade layers and replacing the subbase, base and paving.

27.4.7: Inspection and Testing of Right-of-way, or Recreational Pathway Easement Work

Adequate inspections ensure compliance with County requirements and are the basis for release of maintenance responsibility and/or for release of any bond. It is the responsibility of the permittee to contact the Road & Bridge Department one day in advance of required inspections. In-progress inspections of all elements of work will eliminate the need for extensive post testing. At least one inspection at the conclusion of right-of-way or recreational pathway easement work is required. In making this inspection, the Road & Bridge Department shall check for compliance with these regulations and approved plans, and also for adequate cleanup of roadway surfaces and the right-of-way, or recreational pathway easement.

Any work or material which does not conform to these regulations, any pavement failures or broken asphalt, damaged signs or fencing, any remaining debris either in the roadway or adjacent property, or improper drainage, shall be brought to the attention of the permittee. Any work in which untested or unaccepted materials are used shall be ordered removed and replaced at the permittee's expense.

Any party who, without first having obtained an access permit and/or who, having made a cut in a public right-of-way or recreational pathway easement which has settled, has failed or which has not been repaired in conformance with established county standards and specifications, shall be subject to a stop work order issued by the Road & Bridge Department, whereupon such party shall, except in emergency situations, discontinue all work within the public right-of-way or recreational pathway easement until such time as the required repair has been satisfactorily completed and no further permits will be issued until the repair has been made or the county reimbursed for its expenses.

The County may, on its own initiative, make required repairs and bill the responsible party. Such charges shall include, but not necessarily be limited to, costs for labor, materials, equipment on a portal to portal basis, administrative staff time and, if applicable, reasonable attorney's fees incurred by the County.

In determining whether or not right-of-way, or recreational pathway easement work done by the permittee complies with these regulations, the Road & Bridge Department may consult with the Engineering Department or authorized representative. If it is decided testing is required to ascertain compliance, the most recent standard methods of AASHTO or ASTM shall be used and conducted by an independent testing firm at the permittee's expense. If the permittee maintains his own testing equipment and qualified personnel, the requirement for an independent testing firm may be waived by the Road and Bridge Department or authorized representative. Copies of test data shall be furnished to the Road & Bridge Department in a timely manner.

27.4.8: Responsibility for Corrective Work Upon Completion of Right-of-way, or Recreational Pathway Easement Work

The permittee shall be fully responsible for the maintenance and correction of any faulty construction, including unstable road cuts and chuckholes developed during the construction period. The roadway or recreational pathway and roadside or recreational pathway side areas where utility work has been performed shall be thoroughly cleared of all debris and extraneous material and shall be resolved to the satisfaction of the Road & Bridge Department. Failure to do so could be cause for denial of future right-of-way permits or call of the permittee's bond.

27.4.9: Guarantee Period for Right-of-way or Recreational Pathway Easement Work

The permittee shall be responsible for a period of two years after completion of right-of-way, or recreational pathway easement work for any maintenance or repair necessary to keep the roadway or recreational pathway in an acceptable condition. The County shall retain the permittee's bond for the guarantee period to insure any required corrective work is done. The permittee may apply in writing to the Road and Bridge Director or his authorized representative for release of a portion of his bonding commitment, and such release may be granted with approval of the Road and Bridge Director or his authorized representative.

27.4.10: Changes Affecting Utilities

Future changes to County roads or recreational pathways may require the relocation or removal of utility installations. For minor changes, the affected utility company shall complete the relocation or removal within thirty days after notification by the Road & Bridge Department. For major utility relocation projects involving extensive design, securing of contracts or materials orders, the affected utility company shall complete the relocation or removal within ninety days of approval from the Road & Bridge Department for the final design. To avoid the necessity for such changes, utility companies are encouraged to locate their facilities consistent with future plans for County roadways or recreational pathways.

27.5: ROAD ACCEPTANCE

27.5.1: Purpose and Intent

The purpose of this section is to outline the County's policy regarding acceptance of roads for maintenance, and responsibilities of property owners adjacent to public rights-of-way.

Pursuant to C.R.S. § 43-2-110(1)(b), the Board of County Commissioners has adopted an official map of the road system of the county as the proper depiction of the County's road system The Board amends the official map from time to time and solicits public comment on the same.

27.5.2: Procedure to Petition for Acceptance of Roads for County Maintenance

The County will consider petitions for acceptance of a new county road or an extension of an existing county road into its county road maintenance system once a year. The County Engineer shall accept requests from the public or other governmental entities for the adoption of such a road over the course of each year but such requests will be reviewed and acted upon by the Board only once a year when the composition of the official county road map is considered. To ensure consideration for the upcoming calendar year, requesting parties must submit the following to the County Engineer on or before May 31:

i. A written request describing the road or extension thereof or change in functional classification and signed by the requesting party(ies);

ii. Copies of any deeds, plats, surveys or relevant historical documents reasonably available to the requesting party tending to establish the public nature of the road and the historic level of maintenance of the road;

iii. A detailed description of the existing condition of the road and an explanation of whether such road meets the road and bridge design standards and construction specifications set forth herein. To the extent that the road does not meet such standards and specifications, a detailed description of its deficiencies, an estimate of the costs necessary to bring the road up to such standards and specifications and a proposed methodology for paying such costs shall be given; and

iv. The opportunities, if any, for participation or cooperation by third parties or other governmental entities in the improvement or maintenance of the road.

Consideration of requests submitted to the County Engineer after May 31 shall be deferred to the next calendar year.

The County Engineer and Director of Public Works shall review each and every request received consistent with the requirements set forth in this section to determine and advise the Board as to the following:

i. Whether the proposed road meets or is capable of meeting the road and bridge design standards and construction specifications as specified herein;

ii. If the road does not meet the road and bridge design standards and construction specifications, an estimate as to the legal, practical and economic challenges or costs necessary to achieve such standards and specifications;

iii. Whether adoption or reclassification of the road will unreasonably burden, either economically or practically, the County or surrounding property owners;

iv. Whether adoption or reclassification of the road will unfairly distribute maintenance benefits to a particular County maintenance district, private party, special district or homeowner's association;

v. Any other objective criteria deemed relevant by the County Engineer or Director of Public Works.

The County Engineer and Director of Public Works may reject the review of requests that are substantially incomplete.

Once the Board of County Commissioners has adopted the County road map and appropriations are made thereto, such County road map shall dictate the manner in which the roads reflected thereon shall be maintained for the next calendar year. Notwithstanding the foregoing, nothing contained herein shall limit the Board's ability to maintain its roads or regulate vehicular access to and from any public highway under its jurisdiction in order to protect the

public health, safety and welfare, to maintain smooth traffic flow, to maintain highway right-of-way drainage and to protect the functional level of public highways.

27.5.3: Providing for Parking

Parking on County roads is illegal in Archuleta County and it is the responsibility of every property owner to provide adequate off right-of-way parking. On-road parking presents particular difficulties during snow plowing season and the Sheriff's Department may order illegally parked cars to be towed. In addition, a plow operator may, at his discretion, decline to plow all or portions of a road if one or more cars are parked so as to impede plowing.

27.5.4: Providing for Drainage

[Reserved]

27.5.5: Repairing Damage

Whenever a property owner, Applicant, contractor, or any other individual undertakes an activity that damages a County road, road right-of-way, or recreational pathway easement they are responsible for restoring the road to at least its original condition. This requirement applies especially to damage caused by construction activities adjacent to a County road. Ultimate responsibility for assuring adequate restoration is accomplished lies with the owner of the property where construction is occurring.

27.6: VARIANCES FROM DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS

The Planning Commission and the Board of County Commissioners may under the following circumstances grant exceptions from the design standards and construction specifications contained in these regulations:

A. Where, by reason of exceptional topographic or physical conditions or other extraordinary and exceptional situations or conditions, the strict application of these regulations would result in peculiar and exceptional practical difficulties to, or exceptional and undue hardship upon, an individual proposing to construct a road, bridge or recreational pathway provided the conditions in Section 27.6.C. are met.

B. Where an individual is proposing to construct a low volume, local access road or recreational pathway and the strict application of these regulations would result, in the opinion of the County Engineer, in excessive cut and fill slopes, visual scarring, or other environmental damage, variances in road or recreational pathway design standards may be granted if granting the variance will result in lessened environmental damage, and the conditions in Section 27.6.C. are met. In reviewing such requests, the County Engineer shall consider the following:

    1. The effect of using a lesser design standard on public health and safety including the ability of emergency vehicles to gain access using roads or recreational pathways built to a lesser construction specification

    2. The severity of the terrain crossed by the road alignment

    3. The availability of alternative alignments where the same or more stringent design standards could be met with the same or less environmental damage

    4. The length of road or recreational pathway segments which will be built to a lesser specification

    5. The amount of snowfall anticipated and degree of exposure of the road or recreational pathway surface to sun

C. Variances from the difficulties or hardships described in Section 27.6.A. and/or 27.6.B. may be granted provided relief will not result in substantial detriment to public health, safety and welfare, substantial

impairment of the road or recreational pathway design standards and construction specifications, or the granting of any special privilege or use. Prior to the County Engineer taking action, the Engineering Department shall refer any variance request to the appropriate fire district, the Road & Bridge Department, affected individuals or parties, and other interested agencies for comment.

27.7: ENFORCEMENT OF DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS

27.7.1: General Rule

These Road Design Standards shall be enforced in accordance with the requirements of Colorado law and as provided herein. Each enforcement remedy can be invoked by Archuleta County independently or in conjunction with any or all of the other enforcement remedies available under the law. The Board of County Commissioners, County Administrator, County Engineer, Director of Public Works, County Attorney and such other persons as the Board of County Commissioners may designate are charged with and authorized to enforce all the requirements of these Road Design Standards.

27.7.2: Enforcement When Subdividing Property

27.7.2.1: Requirement for Subdivision Improvements Agreement and Financial Guarantee

No final plat shall be recorded until the improvements required by the County are completed (see Land Use Regulations section 7.6). Any roads, bridges or recreational pathways required to be constructed, improved or upgraded shall meet the design standards and construction specifications contained in these regulations, or as allowed by any variance approved by the Board of County Commissioners.

27.7.2.2: Use of Collateral

As improvements are completed, the subdivider may apply to the Planning Department for release of part of the financial guarantee. Upon inspection and approval by the County Engineer and Planning Director, the County shall release the financial guarantee. If the County Engineer determines that any of the improvements are not constructed in compliance with these regulations, they shall furnish the subdivider a list of specific deficiencies and be entitled to withhold that part of the financial guarantee necessary to insure compliance. If the County determines that the subdivider will not construct any or all of the improvements in compliance with these regulations, the Board of County Commissioners may withdraw and employ funds from the financial guarantee necessary to construct the required improvements.

27.7.2.3: Restrictions on Transfer of Property

See Land Use Regulations section 7.7.5.

27.7.3: Use of Property for Road, Bridge, and Construction

It is unlawful to erect, construct, reconstruct, alter, maintain or use any building or structure or to use any land in violation of these regulations (C.R.S. 30-28-124).

Any person, firm or corporation violating any portion of these regulations is guilty of misdemeanor and, upon conviction thereof, shall be punished by a fine of not more than one hundred dollars, or by imprisonment in the County Jail for not more than ten days, or by both such fine and imprisonment. Each day during which such illegal erection, construction, reconstruction, alteration, maintenance or use continues shall be deemed a separate offense (C.R.S. 30-28-124).

The issuance of a building permit or of a certificate of occupancy may be withheld for property unless the plans for the proposed erection, construction, reconstruction, alteration or use fully conform to these regulations or for property on which a violation of the provisions of these regulations exist, until such violation has been corrected to

the satisfaction of the Board of County Commissioners (C.R.S. 30-28-14).

27.7.4: Issuance of Work Stoppage Injunction

These regulations may be enforced by work stoppage injunctions issued by the District Court pursuant to law or suit that may be filed by the County Attorney on behalf of the Board of County Commissioners for damages resulting to County rights-of-way due to noncompliance with these regulations.

27.8: EFFECTIVE DATE OF DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS

The Effective Date of these Road & Bridge Design Standards and Construction Specifications shall be November 2, 2005. Each land use or development project previously approved by Archuleta County and for which a property right is currently vested under C.R.S. § 24-68-101 *et seq.* on the Effective Date of these regulations may be developed according to the road and bridge design standards and construction specifications in effect at vesting. Projects that have received sketch plan or preliminary plan approval prior to the Effective Date of these regulations are subject to compliance with all requirements set forth herein (except to the extent they may be exempted due to the existence of a valid common law vested right). Amendments to approved final plats or permits shall be subject to review for compliance with these regulations. A complete application submitted for preliminary plan, land use permit, building permit or any other type of land use or development approval under the land use regulations but where the County has not taken final action on such application before the Effective Date, shall be subject to compliance with these standards and specifications.

27.9 CONFLICTS WITH OTHER LAWS AND RESTRICTIONS

A. Conflict with Other governmental Regulations. If the provisions of these standards and specifications are inconsistent with those of state, federal or other governmental regulations, the more restrictive provision will control, to the extent permitted by law.

B. Conflict with Other County Regulations – If the provisions of these standards and specifications are inconsistent with one another, or if they conflict with provisions found in other adopted ordinances, resolutions or regulations of the county, the more restrictive provision will control.

27.10 MINIMUM REQUIREMENTS

The requirements of these Road & Bridge Design Standards and Construction Specifications shall be regarded as the minimum requirements necessary for the protection of the public health, safety and welfare.

27.11 COMPUTATION OF TIME

The time in which an act is to be done shall be computed by excluding the first day and including the last day. If a deadline or required date of action falls on a Saturday, Sunday or legal holiday observed by the County, the deadline or required date of action shall be the next day that is not a Saturday, Sunday or holiday observed by the county.

27.12 SEVERABILITY

If any section, subsection, paragraph, clause, phrase or provision of these standards and specifications shall be adjudged invalid or held unconstitutional by a court of competent jurisdiction, it shall not affect the validity of these standards and specifications, as a whole or any part or provision hereof, other than the part so adjudged to be invalid or unconstitutional. It is declared legislative intent that the remaining provisions of these standards and specifications shall continue in full force and effect.

Table 27-1

[Reserved]

Table 27-2 Per Unit Density Average Daily Traffic

Type	Unit	Per Unit ADT
Residential	Per Dwelling Unit	10.0
Condominium	Per Dwelling Unit	7.0
Mobile Home Park	Per Mobile Home	7.0
Hotel	Per Room	10.5
Restaurant	Per 1000 SF Gross	164.0
Commercial	Per 1000 SF Gross	115.0
Office	Per 1000 SF Gross	12.3
Campground	Per Space	6.6
RV Park	Per Space	6.6
Supermarket	Per 1000 SF Gross	125.0

Note: Alternate ADT values determined by a licensed professional engineer qualified in traffic engineering may be used.

Table 27-3 Summary of Road Design Elements

Design Element	Minor Arterial	Major Collector	Minor Collector	Local Access	Low Volume	Primitive
Right of Way (Min)	100	80	80	60	50	40
Recommended Travel Speed	40-60	35-45	35-40	25-35	20-35	20-30
Design Speed	Travel Speed +10	Travel Speed +5	Travel Speed +5	Travel Speed +5	Travel Speed	Travel Speed
Number of Lanes	2-4	2	2	2	2	1-2
Lane Width (ft)	12	12	12	11	10	10-18 (1)
Shoulders (ft)	6	4	4	4	2	2
Maximum Sustained Grade (%) (2)	8%	8%	8%	8%	8%	10%
Bridge Width	Same as Roadway	32	32	30	24	Same as Roadway
Design Capacity	TBD	TBD	TBD	TBD	TBD	TBD

(1) For roads having one lane, lane must be 18'; for roads having two lanes, each lane must be 10'
(2) See Section 27.1.3.3.A.2.a and 27.1.3.3.A.2.b for exceptions

Table 27-4 Stopping and Passing Site Distance

Reference: *A Policy on Geometric Design of Highways and Streets* 2001; American Association of State Highway and Transportation Officials; Exhibits: 3-1, 3-2, 3-5, 3-7.

Design Speed	Stopping Sight Distance	Passing Site Distance
15	100	500
20	150	700
25	200	900
30	250	1100
35	300	1300
40	400	1500
45	500	1650
50	600	1800
55	700	1950

Table 27-5 Minimum Radius of Curvature

Reference: *A Policy on Geometric Design of Highways and Streets;* 2001; American Association of State Highway and Transportation Officials; Exhibits: 3-26, 3-51, 3-52.

Design speed	Minimum Radius of Curvature	Minimum Tangent Lengths
15	75	50
20	125	75
25	175	100
30	250	150
35	375	200
40	550	250
45	700	250
50	850	250
55	1200	250

Table 27-6 Crown Slopes

Type of Surface	Crown Slope %
Pavements	2.0
Gravel - Subbase	2.0
Gravel - Base	4.0

Table 27-7 Design Chart for Superelevation and Superelevation Run-off

Reference: *A Policy on Geometric Design of Highways and Streets; 2001; American Association of State Highway and Transportation Officials;* Exhibit: 3-29.

Degree of Curve	20 MPH e	20 MPH L	30 MPH e	30 MPH L	40 MPH e	40 MPH L	50 MPH e	50 MPH L	60 MPH e	60 MPH L
1	NC	0	NC	0	NC	0	RC	0	.029	175
2	NC	0	RC	0	.021	125	.038	150	.051	175
3	NC	0	.025	100	.038	125	.053	150	.068	180
4	RC	50	.031	100	.047	125	.063	150	.078	210
5	.021	50	.038	100	.055	125	.071	170		
6	.025	50	.043	100	.062	130	.077	180	Dmax = 4˚45’	
7	.028	50	.048	100	.067	140	.080	190		
8	.031	50	.053	100	.071	150				
9	.035	50	.056	100	.075	160	Dmax = 7˚30’			
10	.037	60	.060	110	.078	160				
12	.043	60	.065	120	.080	170				
14	.047	70	.070	130						
16	.051	70	.074	130	Dmax - 12˚15’					
18	.054	80	.077	140						
20	.057	90	.079	140						
22	.060	90	.080	140						
24	.062	100								
28	.067	100	Dmax=22˚45’							
32	.070	110								
36	.074	110								
40	.076	120								
44	.078	120								
48	.079	120								
52	.080	120								

Dmax = 53˚30’
D = Degree of Curve and D = 5730/R
e = rate of superelevation
L = minimum length of runoff
Source: A Policy on Geometric Design of Highways and Streets, 1984; pp 187-190
NC = Normal Crown Section

RC = Remove adverse crown, superelevate at normal crown slope

Table 27-8 Minimum Traffic Indices

Road Class	Minimum TI
Primitive	3.5
Low Volume	4.5
Local Access	5.0
Minor Collector	6.0
Major Collector	7.0
Major Collector in Industrial Area	8.5
Arterials (Principal and Minor)	10.0

Table 27-9 Minimum Structural Sections

Road Class	Gravel	Paved *
Primitive	6” Base Course 3” Subbase	3”Asphalt 3”Base course 3” Subbase
Low Volume	6” Base Course 3” Subbase	3”Asphalt 3”Base course 3” Subbase
Local Access	6” Base Course 4” Subbase	3”Asphalt 3”Base course 3” Subbase
Major and Minor Collectors	Not Applicable	4”Asphalt 4” Base Course 4” Subbase
Arterials (Principal and Minor)	Not Applicable	6” Asphalt 4” Base Course 4” Subbase
Shared Use Recreational Pathway	Not applicable	3”Asphalt 3” Base Course 3” Subbase
Concrete Trail	Not applicable	5”Fibermesh Concrete 8” Base Course if on disturbed soil
Asphalt Trail	Not applicable	3”Asphalt 8” Base Course
Crusher Fines Trail	4”Crusher Fines on Geotextile Fabric	Not applicable
Natural Surface Trail	Not applicable	Not applicable

- Full depth asphalt or concrete designs will be considered and may be used with approval of the County Engineer
- Subbase may be substituted with Base Course with prior approval

Table 27-10 Coefficient of Runoff

Type of Surface	Vegetation Density	Value of C=
Roofs		.97
Pavements		
Concrete or Asphalt		.97
Gravel from clean and loose, to clayey And compact		.60
Earth Surfaces		
Sand from uniform grain size, no fines to well graded, some, clay or silt	Bare	.60
	Light Vegetation	.45
	Dense Vegetation	.35
Clay, from course sandy or silty, to pure colloidal clay	Bare	.70
	Light Vegetation	.50
	Dense Vegetation	.40

Table 27-11 Maximum Permissible Velocities

Channel Material	"n"	Velocity (ft/sec)
Well established grass	.05	5
Bunched grasses with exposed soil	.04	3
Fine sand or silt	.02	1
All other bare soils	.03	2

Table 27-12 - Driveway Widths

Reference: *A Policy on Geometric Design of Highways and Streets;* 2001; American Association of State Highway and Transportation Officials; Exhibit: 3-68.

Type of Service	Minimum Driveway Width	Minimum Centerline Radius of Curvature
COMMERCIAL	20 feet	65 feet
RESIDENTIAL		
Single family		
< 200' in length	12 feet	N/A
> 200' in length	14 feet	40 feet
Serving two to four units		
< 200' in length	12 feet	N/A
> 200' in length	20 feet	40 feet
Multi-family	22 feet	65 feet

TURNOUT SPACING FOR DRIVEWAYS

LENGTH	TURNOUTS (8' x 30')
< 400 feet	None
400 - 800 feet	One turnout at midway point of driveway
>800 feet	Every 400 feet

DRIVEWAY TURNAROUNDS FOR EMERGENCY EQUIPMENT

LENGTH	TURNAROUNDS
RESIDENTIAL	
< 400 feet	None
> 400 feet	One to within 150' of dwelling unit
MULTI-FAMILY, INDUSTRIAL, COMERCIAL	One turnaround as specified in Figure 27-7 if the driveway dead ends

Table 27-13 Aggregate Gradations for Gravel Roads

Standard Sieve Size	% Passing by Weight
Subbase Course	
1-1/2”	100%
1”	95-100%
No. 4	30-70%
No. 200	5-12%
P.I.	0-6
Base Course	
¾”	100%
No. 4	30-60%
No. 8	25-55%
No. 200	8-15%
P.I.	6-12

Reference: *Gravel Roads Maintenance and Design Manual;* 2000; Federal Highway Administration; Table 1, page 42..

Note: Aggregate mixtures for gravel roads shall have a liquid limit of no greater than 30 and a plasticity index as specified above when the aggregate is tested in accordance with AASHTO T-89 and T-90, respectively.

Standard Sieve Size	CDOT Class 5 (% Passing)	CDOT Class 6(% Passing)
1-1/2”	100%	--
1”	95-100%	--
¾”	--	100%
No. 4	30-70%	30-65%
No. 8	--	25-55%
No. 200	3-15%	3-12%

Table 27-14 Aggregate Gradations for Asphalt Roads

Table 27-15 Aggregate Gradations for Hot Mix Asphalt (HMA)

Sieve Size	Percent of Weight Passing Square Mesh Sieves		
	Grading S	**Grading SG**	**Grading SX**
1½		100	
1	100	90 - 100	
¾	90 - 100		100
½	*	*	90 - 100
⅜	*	*	*
No. 4	*	*	*
No. 8	23 - 49	19 - 45	28 - 58
No.16			
No. 30	*	*	*
No. 50			
No. 100			
No. 200	2 - 8	1 - 7	2 - 10

Table 27- 16 Performance Graded Binder Specifications

PROPERTY	REQUIREMENT FOR PG BINDER							AASHTO TEST No.
	58-22	58-28	58-34	64-22	64-28	70-28	76-28	
Average 7-day Pavement Design Temperature, °C	<58			<64		<70	<76	
Minimum Pavement Design Temperature, °C	>-22	>-28	>-34	>-22	>-28	>-28	>-28	
Original Binder Properties								
Flash point temp, °C minimum	230	230	230	230	230	230	230	T 48
Viscosity at 135°C, Pa•s, Maximum	3	3	3	3	3	3	3	TP 48
Dynamic Shear, Temperature °C, where G*/Sin @ 10 rad/s ≥ 1.00 kPa	58	58	58	64	64	70	76	TP 5
Ductility, 4 °C (5 cm/min) cm, min.					50			T 51
Toughness, joules minimum					12.4			CP L-2210♦
Tenacity, joules, minimum					8.5			CP L-2210♦
RFTO Residue Properties								T 240
Mass Loss, percent minimum	1.00	1.00	1.00	1.00	1.00	1.00	1.00	T 240
Dynamic Shear Temp, °C where G*/Sin @ 10 rad/s ≥ 2.20 kPa	58	58	58	64	64	70	76	TP 5
Elastic Recovery, 25 °C, Percent Min.						50	50	CP L-2211 Method A♦
Ductility, 4 °C (5 cm/min) cm, min.					25			T 51
PAV Residue Properties, Aging Temperature 100° C								PP 1
Dynamic Shear Temp, °C where G*/Sin @ 10 rad/s ≤ 5000 kPa	22	19	16	25	22	25	28	TP 5
Creep Stiffness, @ 60 s Test Temp, in °C	-12	-18	-24	-12	-18	-18	-18	
S, maximum, MPa	300	300	300	300	300	300	300	TP 1
m-value, minimum	0.300	0.300	0.300	0.300	0.300	0.300	0.300	TP 1
Direct Tension, Temp. in °C, @ 1 mm/min., where Failure Strain ≥ 1.0%♣	-12	-18	-24	-12	-18	-18	-18	TP 3

♦ Colorado Procedure

♦ Colorado Procedure

♦ Colorado Procedure

♣ If the creep stiffness (S) is below 300 MPa, the direct tension test is not required. If S is between 300 and 600 MPa, the direct tension failure strain requirement can be used in lieu of the creep stiffness requirement. The m-value requirement must be satisfied in both cases.

Table 27-17 Minimum Discharge and Delivery Temperatures

Asphalt Grade	Minimum Mix Discharge Temperature, °F[1]	Minimum Delivery Mix Temperature, °F[2]
PG 58-28	275	235
PG 58-22	280	235
PG 64-22	290	235
AC-20 (rubberized)	320	280
PG 76-28	320	280
PG 70-34	300	280
PG 64-28	300	280
PG 58-40	300	280

[1] The maximum discharge temperature shall not exceed the minimum discharge temperature by more than 30° F
[2] Delivered mix temperature shall be measured behind the paver screed.

Table 27-18 Minimum Air and Surface Temperatures

Compacted Layer Thickness In Inches	Minimum Air and Surface Temperature, °F			
	Top Layer		Layers Below Top Layer	
	Note (1)	Note (2)	Note (1)	Note (2)
1” or Less	60	70	50	60
1” to 3”	50	60	40	50

Notes: Air Temperature is taken in the shade. Surface is defined as the existing base on which the new pavement is being placed.

(1)Temperatures to be used when the mix contains unmodified asphaltic cement (PG 58-22, PG 58-28, PG 64-22) or PG 76-28, PG 70-34, PG 70-28, PG 64-28 PG 58-40 and PG 58-34.

(2)Temperatures to be used when mix contains AC-20R [AC-20 (rubberized)]

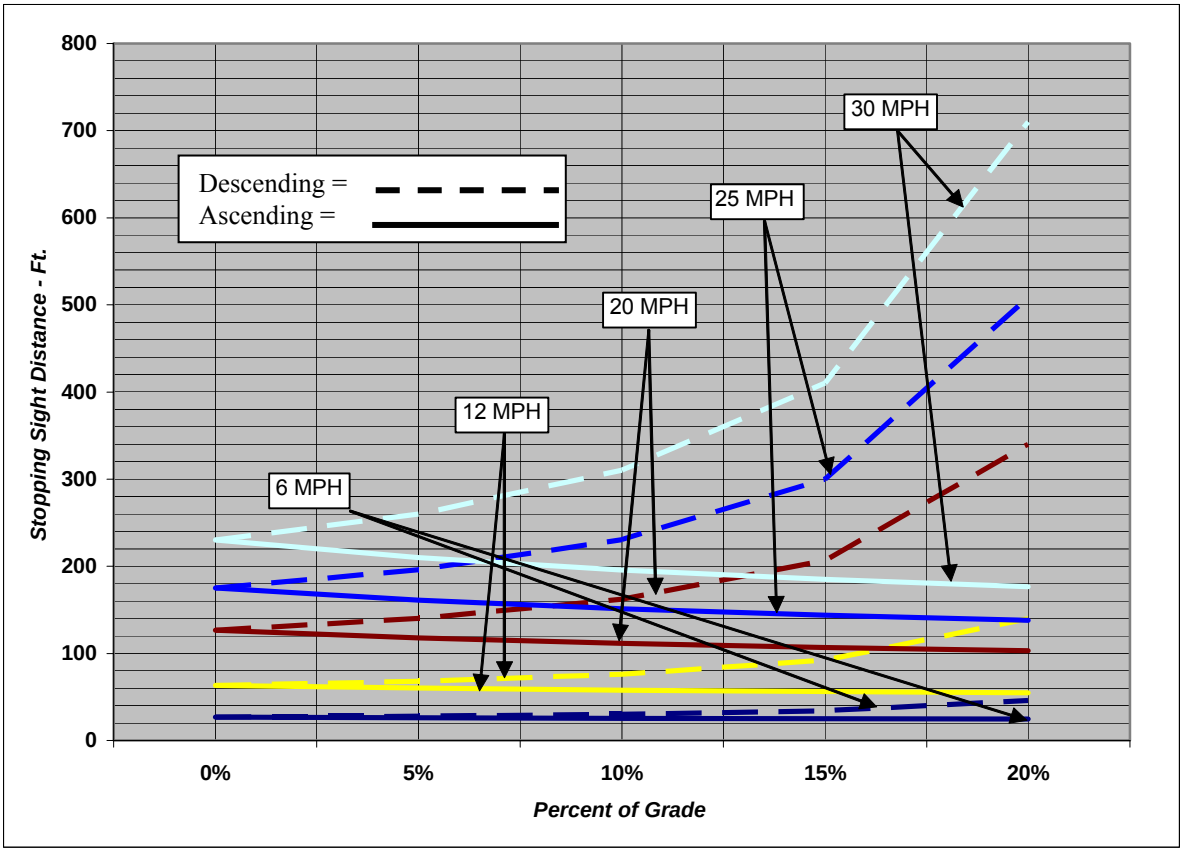
Table 27-19 Minimum Radii Requirements for Shared use paths Based on a 15° Lean Angle

Design Speed (V) (mph)	Lean Angle (°) (degrees)	Minimum Radius (R) (ft)
12	15	36
20	15	100
25	15	156
30	15	225

Table 27-20 Minimum Radii Requirements for Shared use paths Based on 2% Superelevation Rates and 20° Lean Angle

Design Speed (V) (mph)	Friction Factor (f) (Paved Surface)	Minimum Radius (R)(ft)
12	0.31	30
20	0.28	90
25	0.25	155
30	0.21	260

Table 27-21 – Minimum Stopping Distance vs. Grades for Various Design Speeds for Recreational Pathways



$$S = \frac{V^2}{30(f \pm G)} + 3.67V$$

Where: S = Stopping Distance (Ft)
V = Velocity (MPH)
F = Coefficient of friction (use 0.25)
G = Grade (ft/ft) (rise/run)

Table 27-22 - Minimum Length of Crest Vertical Curve (L) Based on Stopping Distance for Recreational Pathways

A	S = Stopping Distance (ft)														
%	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300
2												30	70	110	150
3								20	60	100	140	180	220	260	300
4						15	55	95	135	175	215	256	300	348	400
5					20	60	100	140	180	222	269	320	376	436	500
6				10	50	90	130	171	216	267	323	384	451	523	600
7				31	71	111	152	199	252	311	376	448	526	610	700
8			8	48	88	128	174	228	288	356	430	512	601	697	800
9			20	60	100	144	196	256	324	400	484	576	676	784	900
10			30	70	111	160	218	284	360	444	538	640	751	871	1000
11			38	78	122	176	240	313	396	489	592	704	826	958	1100
12		5	45	85	133	192	261	341	432	533	645	768	901	1045	1200
13		11	51	92	144	208	283	370	468	578	699	832	976	1132	1300
14		16	56	100	156	224	305	398	504	622	753	896	1052	1220	1400
15		20	60	107	167	240	327	427	540	667	807	960	1127	1307	1500
16		24	64	114	178	256	348	455	576	711	860	1024	1202	1394	1600
17		27	68	121	189	272	370	484	612	756	914	1088	1277	1481	1700
18		30	72	128	200	288	392	512	648	800	968	1152	1352	1568	1800
19		33	76	135	211	304	414	540	684	844	1022	1216	1427	1655	1900
20		35	80	142	222	320	436	569	720	889	1076	1280	1502	1742	2000
21		37	84	149	233	336	457	597	756	933	1129	1344	1577	1829	2100
22		39	88	156	244	352	479	626	792	978	1183	1408	1632	1916	2200
23		41	92	164	256	368	501	654	828	1022	1237	1472	1728	2004	2300
24	3	43	96	171	267	384	523	683	864	1067	1291	1536	1803	2091	2400
25	4	44	100	177	278	400	544	711	900	1111	1344	1600	1878	2178	2500

When S > L $L = 2S - \frac{900}{A}$

When S < L $L = \frac{AS^2}{900}$

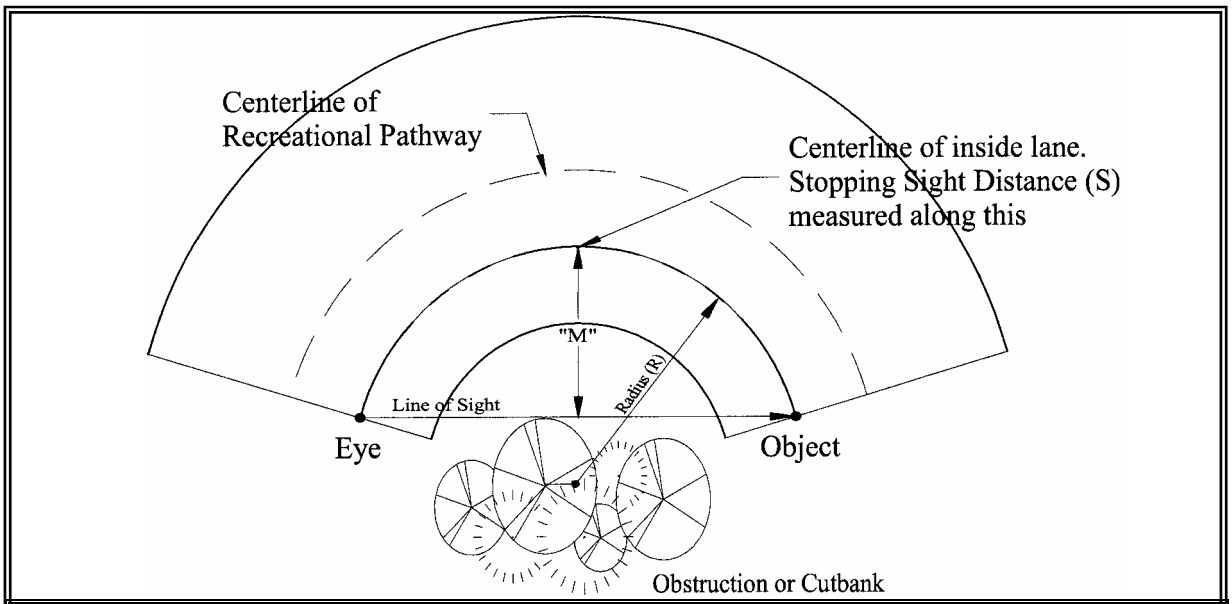
Height of Cyclist's eye = 4.5 ft
Height of object = 0 ft

Shaded area represents S = L

L = Minimum Length of Vertical Curve (ft)
A = Algebraic Grade Difference (%)
S = Stopping Sight Distance (ft)

Minimum Length of Vertical Curve = 3 ft

Table 27-23 – Minimum Lateral Clearance for Horizontal Curves for Recreational Pathways



R (ft)	S = Stopping Sight Distance (ft)														
	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300
25	2.0	7.6	15.9												
50	1.0	3.9	8.7	15.2	23.0	31.9	41.5								
75	0.7	2.7	5.9	10.4	16.1	22.8	30.4	38.8	47.8	57.4	67.2				
95	0.5	2.1	4.7	8.3	12.9	18.3	24.7	31.8	39.5	48.0	56.9	66.3	75.9	85.8	
125	0.4	1.6	3.6	6.3	9.9	14.1	19.1	24.7	31.0	37.9	45.4	53.3	61.7	70.6	79.7
155	0.3	1.3	2.9	5.1	8.0	11.5	15.5	20.2	25.4	31.2	37.4	44.2	51.4	59.1	67.1
175	0.3	1.1	2.6	4.6	7.1	10.2	13.8	18.0	22.6	27.8	33.5	39.6	46.1	53.1	60.5
200	0.3	1.0	2.2	4.0	6.2	8.9	12.1	15.8	19.9	24.5	29.5	34.9	40.8	47.0	53.7
225	0.2	0.9	2.0	3.5	5.5	8.0	10.8	14.1	17.8	21.9	26.4	31.3	36.5	42.2	48.2
250	0.2	0.8	1.8	3.2	5.0	7.2	9.7	12.7	16.0	19.7	23.8	28.3	33.1	38.2	43.7
275	0.2	0.7	1.6	2.9	4.5	6.5	8.9	11.6	14.6	18.0	21.7	25.8	30.2	34.9	39.9
300	0.2	0.7	1.5	2.7	4.2	6.0	8.1	10.6	13.4	16.5	19.9	23.7	27.7	32.1	36.7
350	0.1	0.6	1.3	2.3	3.6	5.1	7.0	9.1	11.5	14.2	17.1	20.4	23.9	27.6	31.7
390	0.1	0.5	1.2	2.1	3.2	4.6	6.3	8.2	10.3	12.8	15.4	18.3	21.5	24.9	28.5
500	0.1	0.4	0.9	1.6	2.5	3.6	4.9	6.4	8.1	10.0	12.1	14.3	16.8	19.5	22.3
565		0.4	0.8	1.4	2.2	3.2	4.3	5.7	7.2	8.8	10.7	12.7	14.9	17.3	19.8
600		0.3	0.8	1.3	2.1	3.0	4.1	5.3	6.7	8.3	10.1	12.0	14.0	16.3	18.7
700		0.3	0.6	1.1	1.8	2.6	3.5	4.6	5.8	7.1	8.6	10.3	12.0	14.0	16.0
800		0.3	0.6	1.0	1.6	2.2	3.1	4.0	5.1	6.2	7.6	9.0	10.5	12.2	14.0
900		0.2	0.5	0.9	1.4	2.0	2.7	3.6	4.5	5.6	6.7	8.0	9.4	10.9	12.5
1000		0.2	0.5	0.8	1.3	1.8	2.4	3.2	4.0	5.0	6.0	7.2	8.4	9.8	11.2

$$M = R\left[1 - Cos^{-1}\left(\frac{28.65\,S}{R}\right)\right] \text{ and } S = \frac{R}{28.65}\left[Cos^{-1}\left(\frac{R-M}{R}\right)\right]$$

where: S = Stopping Sight Distance (ft)
R = Radius of Centerline of Lane (ft)
M = Distance from Centerline of Lane to Obstruction (ft)

Note: 1. - Formula only applies when S is equal or less than length of curve
2. - Line of sight is approximately 2.3 feet above centerline of inside lane at point of obstruction