

Rural Local Roadway Design and Technical Criteria

**TABLE A-1
SUMMARY OF ROADWAY DESIGN AND TECHNICAL CRITERIA**

	LOCAL RURAL ROADS				
	Rural Local Type I	Rural Local Type II	Rural Local Type III	Rural Local Type IV	35-Acre Private Rural Road
Posted Speed (mph)	25	25	25	25	25
Design Speed (mph)	30	30	30	30	25
Max. Design Traffic Volume (Vehicles Per Day)	1,500	1,500	400	100	N/A
Min. Right-of-Way (feet)	60	50	50	50	50
Travel Lanes	2	2	2	2	2
Curb & Walks	Curb and gutter not required	Mountable curb	Curb and gutter not required Mountable curb	Curb and gutter not required	Curb and gutter not required
Street Sections	24' paved width, 2-3' gravel shoulders, 2-roadside ditches, total is 30' roadway.	22' paved width, 2-2' gutter pans, total is 26' fl-fl	20' asphalt width, 2-3' gravel shoulders, 2-roadside ditches, total is 26' roadway. 20' asphalt width, 2-2' gutter pans, total is 24' fl-fl 20' asphalt width, composite shoulder & ditch and curb.	24' gravel width, 2-roadside ditches, total is 24' roadway.	24' gravel width, 2-roadside ditches, total is 24' roadway.
Clear Zone (feet)	12	12	12	12	12
HORIZONTAL CRITERIA					
Min. Centerline Curve Radii	225'	225'	225'	225'	100'
Curb Return Radii @ Arterial	N/A	N/A	N/A	N/A	25'
Curb Return Radii @ Collector	30'	30'	30'	30'	25'
Curb Return Radii @ Local	25'	25'	25'	25'	25'
VERTICAL CRITERIA					
K-Value Crest	25-30	25-30	25-30	25-30	12
K-Value SAG	35-50	35-50	35-50	35-50	12
Min VCL Crest	50'	50'	50'	50'	*
Min VCL SAG	50'	50'	50'	50'	*
Vertical Gradient	0.5%-6% 7% Mountainous	1%-6% 7% Mountainous	0.5%-6% 7% Mountainous	0.5%-6% 7% Mountainous	0.5%-10%
Max Int. Gradient	See Figure 4.4	See Figure 4.4	See Figure 4.4	See Figure 4.4	4%

Mountainous terrain applies to developments where 50 percent of the site has existing slopes of 15% or greater. The designer should strive to minimize the use of these grades for considerable lengths and on north facing slopes.

*Use equation 7 and 8 in the "Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT_≤400)", AASHTO 2001.

Rural Local Roadway Design and Technical Criteria

1A. Rural Local (Type I)

The Rural Local (Type I) road type permits ditches adjacent to the paved road section, and shall be used in Estate Residential developments (as defined in the Douglas County Zoning Resolution) having a minimum net lot size of 2.5-acres and 8 parking spaces required on each lot. Rural Local roads provide direct access to adjacent property. Traffic carried by local roads should have an origin or a destination within the neighborhood

Posted Speed Limit	25 MPH
Design Speed Limit	30 MPH
Traffic Volumes	Maximum Design Volume is generally 1,500 vehicles per day.
Continuity	Limited
Right-of-Way	60' Minimum
Traffic Control	Signage and pavement markings per MUTCD and Douglas County Signage and Striping Standards as amended.
Number of Travel Lanes	2
Type of Curb, Gutter and Walk	Not required
Turnarounds	47' radius with 3' gravel shoulder
Knuckles	Not allowed
Eyebrows	Not allowed
Street Section	24' paved width 2-3' gravel shoulders 2- roadside ditches.
Street Grades	0.5% to 6%, 7% mountainous
Minimum Centerline Curve Radii	225'
Pavement Return Radii @ Arterial	N/A
Pavement Return Radii @ Collector	30'
Pavement Return Radii @ Local	25'
K-Value Crest	25-30
K-Value SAG	35-30
Minimum VCL Crest	50'
Minimum VCL SAG	50'
Maximum Int. Gradient	See Figure 4.4

A. Function

Rural Local roads provide direct access to adjacent property. Traffic carried by local roads should have an origin or a destination within the neighborhood.

B. Access Conditions

Rural Local (Type I) roads shall only intersect with Rural Local and Rural Collector roads. Direct access to abutting property permitted. Rural Local roads shall not intersect major collectors or arterial roads.

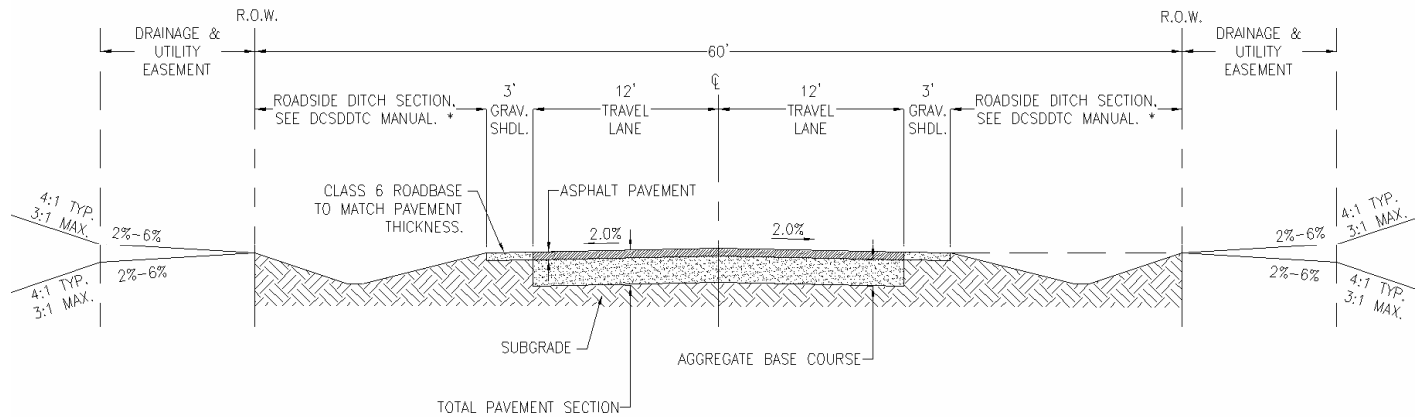
Rural Local Roadway Design and Technical Criteria

C. Design Characteristics

Rural Local roads should be designed to carry traffic that has an origin or destination within the neighborhood. Rural Local roads should not intersect Arterial roads. This category of Rural Local roads shall be for residential developments with a minimum net lot size of 2.5-acres. Public easements for utilities are required along both sides of the Right-of-Way. See also Chapter 12 Utility Locations of these *Roadway Standards*.

D. Street Section

RURAL LOCAL TYPE I (GRAVEL SHOULDERS)



* ROADSIDE DITCH MAY NOT BE REQUIRED IF THERE ARE NO CUT SLOPES ALONG THE ROADWAY.

Rural Local Roadway Design and Technical Criteria

2A. Rural Local (Type II)

The Rural Local (Type II) road permits mountable type curb and gutter adjacent to the paved road section, and shall be used in Estate Residential developments (as defined in the Douglas County Zoning Resolution) having a minimum net lot size of 2.5-acres and 8 parking spaces required on each lot. Rural Local roads provide direct access to adjacent property. Traffic carried by local roads typically has an origin or a destination within the neighborhood.

Posted Speed Limit	25 MPH
Design Speed Limit	30 MPH
Traffic Volumes	Maximum Design Volume is generally 1,500 vehicles per day.
Continuity	Limited
Right-of-Way	50' Minimum
Traffic Control	Signage and pavement markings per MUTCD and Douglas County Signage and Striping Standards as amended.
Number of Travel Lanes	2
Type of Curb, Gutter and Walk	Mountable curb, no sidewalk required
Turnarounds	Minimum 45' flowline radius
Knuckles	Not allowed
Eyebrows	Not allowed
Street Section	26' flowline to flowline
Street Grades	1% to 6%, 7% mountainous
Minimum Centerline Curve Radii	225'
Curb Return Radii @ Arterial	N/A
Curb Return Radii @ Collector	30'
Curb Return Radii @ Local	25'
K-Value Crest	25-30
K-Value SAG	35-30
Minimum VCL Crest	50'
Minimum VCL SAG	50'
Maximum Int. Gradient	See Figure 4.4

A. Function

Rural Local (Type II) roads provide direct access to adjacent property. Traffic carried by local roads typically has an origin or a destination within the neighborhood.

B. Access Conditions

Rural Local (Type II) roads shall only intersect with Rural Local and Rural Collector roads. Direct access to abutting property permitted.

C. Design Characteristic

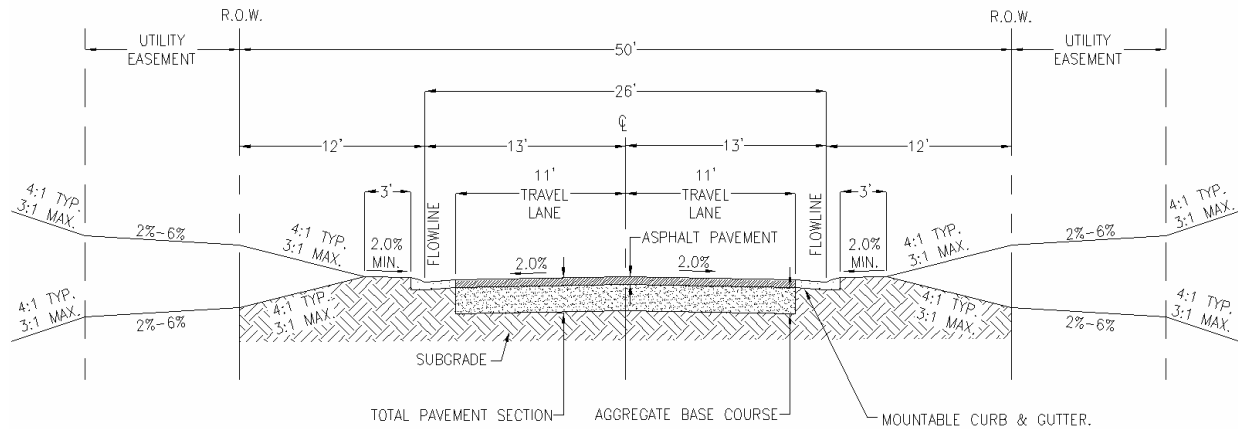
Rural Local roads should be designed to carry traffic that has an origin or destination within the neighborhood. Rural Local roads should not intersect Arterial

Rural Local Roadway Design and Technical Criteria

roads. This category of Rural Local road shall be for residential developments with a minimum net lot size of 2.5-acres. On-street parking is prohibited. Public easements for utilities are required along both sides of the Right-of-Way. See also Chapter 12 Utility Locations of these *Roadway Standards*.

D. Street Section

RURAL LOCAL TYPE II (MOUNTABLE CURB & GUTTER)



Rural Local Roadway Design and Technical Criteria

3A. Rural Local (Type III)

The Rural Local (Type III) road type permits a narrow paved road and may be used only in the Large Rural Residential (LRR), Rural Residential (RR) or Estate Residential (ER) zone districts having a minimum net lot size of 2.5-acres and 8 parking spaces required on each lot. Rural Local roads provide direct access to adjacent property. Traffic carried by local roads should have an origin or a destination within the neighborhood.

Posted Speed Limit	25 MPH
Design Speed Limit	30 MPH
Traffic Volumes	Maximum Design Volume is 400 vehicles per day.
Continuity	Limited
Right-of-Way	50' Minimum
Traffic Control	Signage per MUTCD and Douglas County Signage and Striping Standards as amended.
Number of Travel Lanes	2
Type of Curb, Gutter and Walk	Roadside Ditch or Mountable Curb acceptable; no sidewalk required
Turnarounds	47' radius with 3' gravel shoulder.
Knuckles	Not allowed
Eyebrows	Not allowed
Street Section	20' asphalt surface, 2-3' gravel shoulders, 2-roadside ditches. 20' asphalt surface, Mountable curb, no sidewalk required. Composite allowed.
Street Grades	0.5%-6%, 7% Mountainous
Minimum Centerline Curve Radii	225'
Curb or Pavement Return Radii @ Arterial	N/A
Curb or Pavement Return Radii @ Collector	30'
Curb or Pavement Return Radii @ Local	25'
K-Value Crest	25-30
K-Value SAG	35-50
Minimum VCL Crest	50'
Minimum VCL SAG	50'
Maximum Int. Gradient	See Figure 4.4

A. Function

Rural Local roads provide direct access to adjacent property. Traffic carried by local roads should have an origin or a destination within the neighborhood.

B. Access Conditions

Rural Local (Type III) roads shall only intersect with Rural Local and Rural Minor Collector roads. Direct access to abutting property permitted. Rural Local roads shall not intersect Major Collectors or Arterial roads.

C. Design Characteristics

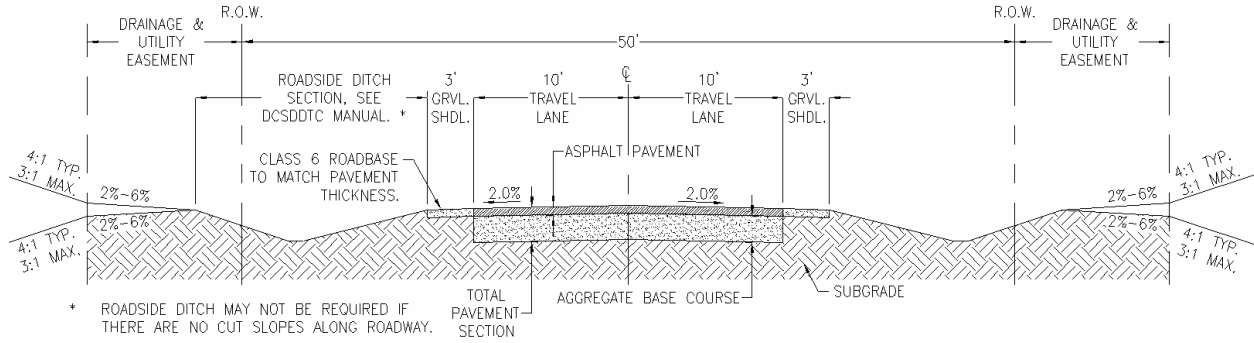
Rural Local roads should be designed to carry traffic that has an origin or destination within the neighborhood. Rural Local roads should not intersect Arterial roads. This category of Rural Local road shall be for residential developments with a minimum net lot size of 2.5-acres. Public easements for utilities are required along both sides of the Right-of-Way. See also Chapter 12 Utility Locations of these *Roadway Standards*.

D. Street Section

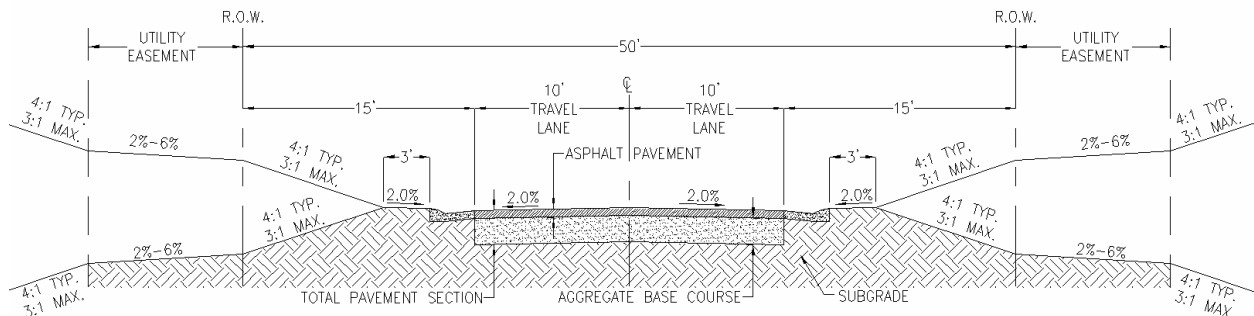
1. The sub-grade and pavement section for the Rural Local (Type III) must conform to the Douglas County Pavement Design per Chapter 5 of these *Roadway Standards*. The owner/developer is responsible to obtain and submit construction inspection reports to the Douglas County Engineering Division for review and acceptance. The Douglas County Building Division shall not issue building permits for any proposed structures located within the development, until the inspection test reports have been accepted.
2. Ditch culverts must be installed along roadside ditch wherever necessary to provide continuous transport of drainage flows. The minimum size shall be 15-inch diameter. Minimum culvert cover is 1'. The maximum ditch side slope at each end of the culvert is 3' horizontal and 1' vertical (3:1). The horizontal alignment of the ditch and depth may vary from the typical road section to facilitate these design criteria. Please reference the *Douglas County Storm Drainage Design and Technical Criteria Manual* for additional standards for roadside/driveway ditch culverts. Discharge from roadside ditch will require an easement if discharging onto a private lot. Sheet flow may require a drainage easement.
3. The minimum road width must be adequate for simultaneous evacuation and emergency response operations in opposite directions. Minimum width is 20' asphalt with: 3' gravel shoulders with roadside ditch, mountable curb and gutter, or a composite section.

Rural Local Roadway Design and Technical Criteria

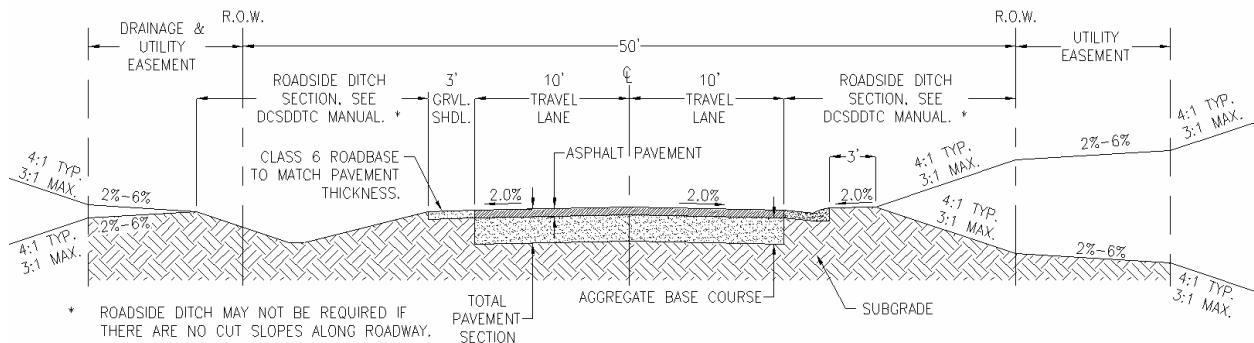
RURAL LOCAL TYPE III (Maximum Design Volume is 400 Vehicles Per Day)



GRAVEL SHOULDER WITH ROADSIDE DITCH



MOUNTABLE CURB AND GUTTER



COMPOSITE

Rural Local Roadway Design and Technical Criteria

4A. Rural Local (Type IV)

The Rural Local (Type IV) road type permits a gravel surfaces and may be used only in the Large Rural Residential (LRR), Rural Residential (RR) or Estate Residential(ER) zone districts having a minimum net lot size of 2.5-acres and 8 parking spaces required on each lot. Rural Local roads provide direct access to adjacent property. Traffic carried by local roads should have an origin or a destination within the neighborhood.

Posted Speed Limit	25 MPH
Design Speed Limit	30 MPH
Traffic Volumes	Maximum Design Volume is 100 Vehicles Per Day.
Continuity	Limited
Right-of-Way	50' Minimum
Traffic Control	Signage per MUTCD and Douglas County Signage and Striping Standards as amended.
Number of Travel Lanes	2
Type of Curb, Gutter and Walk	None
Turnarounds	47' radius with 3' gravel shoulder.
Knuckles	Not allowed
Eyebrows	Not allowed
Street Section	24' gravel surface, 2-roadside ditches
Street Grades	0.5%-6%, 7% Mountainous
Minimum Centerline Curve Radii	225'
Pavement Return Radii @ Arterial	N/A
Pavement Return Radii @ Collector	30'
Pavement Return Radii @ Local	25'
K-Value Crest	25-30
K-Value SAG	35-50
Minimum VCL Crest	50'
Minimum VCL SAG	50'
Maximum Int. Gradient	See Figure 4.4

A. Function

Rural Local roads provide direct access to adjacent property. Traffic carried by local roads should have an origin or a destination within the neighborhood.

B. Access Conditions

Rural Local (Type IV) roads shall only intersect with Rural Local and Rural Minor Collector roads. Direct access to abutting property permitted. Rural Local roads shall not intersect Major Collectors or Arterial roads.

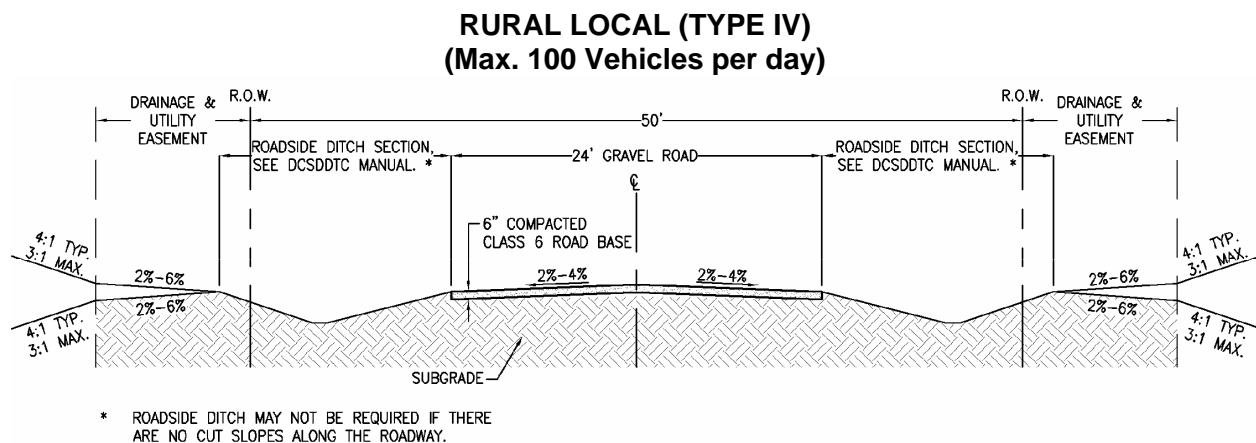
Rural Local Roadway Design and Technical Criteria

C. Design Characteristics

Rural Local roads should be designed to carry traffic that has an origin or destination within the neighborhood. Rural Local roads should not intersect Arterial roads. This category of Rural Local road shall be for residential developments with a minimum net lot size of 2.5-acres. Public easements for utilities are required along both sides of the Right-of-Way. See also Chapter 12 Utility Locations of these *Roadway Standards*.

D. Street Section

1. The sub-grade section for the Rural Local (Type IV) must conform to the Douglas County Pavement Roadway Subgrade Preparation per Chapter 8 of these Roadway Standards. The minimum allowable surface is 6-inches of Class 6 Road Base material. The owner/developer is responsible to obtain and submit subgrade inspection reports and certification of the Class 6 Road Base material to the Douglas County Engineering Division for review and acceptance. The Douglas County Building Division shall not issue building permits for any proposed structures located within the development until the inspection test reports have been accepted.
2. Ditch culverts must be installed wherever necessary to provide continuous transport of drainage flows. The minimum size shall be 15-inch diameter. Minimum culvert cover is 1'. The maximum ditch side slope at each end of the culvert is 3' horizontal and 1' vertical (3:1). The horizontal alignment of the ditch and depth may vary from the typical road section to facilitate these design criteria. Please reference the *Douglas County Storm Drainage Design and Technical Criteria Manual* for additional standards for roadside/driveway ditch culverts. Discharge from roadside ditch will require an easement if discharging onto a private lot. Sheet flow may require a drainage easement.
3. The minimum road width must be adequate for simultaneous evacuation and emergency response operations in opposite directions. Minimum width is 24' gravel surface. Ditches shall be constructed as necessary.



Rural Local Roadway Design and Technical Criteria

5A. 35-Acre Private Rural Road

The 35-Acre Private Rural road type permits gravel surfaces and may be used only in the A-1 zone district where each parcel is 35-acres or larger. Private Rural Local Roads provide direct access to adjacent property.

The following design criterion represents the MINIMUM allowable criteria. In all cases, the road shall be designed to these criteria, or the criteria required for the largest apparatus that may use the road, whichever is greater.

Posted Speed Limits	The posted speeds shall be determined case-by-case, by Douglas County, based upon the horizontal and vertical geometry, road surface, the number of average daily trips, and any other factors that may influence the allowable speed.
Design Speed Limits	25 MPH
Traffic Volumes	Maximum Design Volume is undefined. NOTE: these roads may require regular dust suppression applications particularly as the number of average daily trips increase. It is the owner's responsibility to satisfy all environmental regulations as required by every level of jurisdiction including the EPA
Continuity	Limited
Right-of-Way	50' Minimum
Traffic Control	Signage per MUTCD and Douglas County Signage and Striping Standards as amended.
Number of Travel Lanes	2
Type of Curb, Gutter and Walk	Not required
Turnarounds	50' radius. The length of the "Cul-de-sac" road type shall not exceed 1200 lineal feet, however, Douglas County may further restrict the accepted allowable length based on, but not limited to, factors such as number of structures, available water and/or access for emergency services.
Knuckles	Not allowed
Eyebrows	Not allowed
Street Section	24' gravel travel lane, 2-roadside ditches
Street Grades	0.5%-10%
Minimum Centerline Curve Radii	100'
Pavement Return Radii @ Arterial	25'
Pavement Return Radii @ Collector	25'
Pavement Return Radii @ Local	25'
K-Value Crest	12
K-Value SAG	12
Minimum VCL Crest	Use equation 7 in the "Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT \leq 400)", AASHTO 2001.

Rural Local Roadway Design and Technical Criteria

Minimum VCL SAG	Use equation 8 in the "Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT \leq 400)", AASHTO 2001.
Maximum Int. Gradient	4%

A. Function

35-Acre Private Rural Roads provide direct access to adjacent property. Traffic carried by 35-Acre Private Rural Roads should have an origin or a destination within the neighborhood.

B. Right-Of-Way

All 35-Acre Private Rural Roads shall be legally defined or located in an easement with a minimum width of 50'. An appropriate intersection design shall ensure the line of sight falls within the defined easement. When other design criteria are being used, "easement" is synonymous with Right-of-Way. See also "Sight Distance" in Chapter 4 of these *Roadway Standards*.

C. Access Conditions

Intersects with rural local and rural minor collector roads. Direct access to abutting property permitted. Private Rural Roads shall not intersect major collectors or arterial roads (unless specifically accepted by Douglas County). Formal access permits are required for each intersection with a public road.

D. Design Characteristics

1. General

35-Acre Private Rural Roads should be designed to discourage through traffic in the neighborhood. This category of Private Rural Road shall be for residential developments with a minimum lot size of 35-acres. On-street parking is prohibited. Public easements for utilities are required along both sides of the Right-of-Way, the utility easements may be added to the access easement to form a single combined easement.

The design of these roads must be accomplished by a Professional Engineer Registered in the State of Colorado; then reviewed and accepted by Douglas County. The owner/developer is responsible to obtain and submit construction inspection reports to the Douglas County Engineering Division for review and acceptance. The Douglas County Building Division will not issue building permits for any proposed structures located within the development until the inspection test reports have been accepted. If the information in the submitted reports and data are determined to be unacceptable, the developer is responsible to correct the discrepancy(s) and resubmit new data for acceptance.

2. Surface

The sub-grade section for the 35-Acre Private Rural Road must conform to the Douglas County Pavement Design and Technical criteria. The minimum allowable surface is 6-inches of Class Six Road base material; however the

Rural Local Roadway Design and Technical Criteria

surface needs to be acceptable to the governing Fire District.

3. Gates

Any gate on any road shall be located a minimum of 30' from the outside edge of the through lane of the intersecting road. The opening of the gate must be a minimum of 2' wider than the gated road. Minimum gate dimension is: 24' minimum road width, plus 2' = 26'.

4. Culverts

Ditch culverts must be installed wherever necessary to provide continuous transport of drainage flows. The minimum size shall be 15-inch diameter. Minimum culvert cover is 1'. The maximum ditch slope at each end of the culvert is 3' horizontal and 1' vertical (3:1). The Horizontal alignment of the ditch and depth may vary from the typical road section to facilitate these design criteria. Please reference the *Douglas County Storm Drainage Design and Technical Criteria Manual* for additional standards for roadside/driveway ditch culverts.

5. Street Section

The minimum road width must be adequate for simultaneous evacuation and emergency response operations in opposite directions. Minimum width is 24' gravel surface. Ditches shall be constructed as necessary.

