

Caroline County Road Design Manual

ARTICLE I Introduction

1. Introduction.

The purpose of this Manual is to provide design standards for county roads within Caroline County in conformance with modern engineering standards. Since the County's rural road network plays an essential role in shaping growth, it is important that road planning and design be compatible with land use, zoning, and the County's adopted Comprehensive Plan.

A further intent is to provide a framework within which the experienced engineer will have some latitude for creativity in the layout and design of the road systems and their various components. The Manual establishes minimum design requirements. The design engineer is required to use professional skill, experience and judgment to develop the most feasible and practical design for the planned facility, with particular attention to the safety of the motoring public and the long-term economic interests of County taxpayers. Final determination concerning a development project with respect to road issues (i.e., classification) will be made by the Public Works Director, in consultation with County engineer(s) and in accordance with County Code, the transportation element of the Comprehensive Plan and this Design Manual.

ARTICLE II Design Considerations

2. General design considerations.

The design considerations of rural roads are based on many factors including design speed, functional classification, vehicular volumes, types of vehicles, existing terrain and natural features, community impacts, environmental effects, cost considerations, and right-of-way needed. It is critical to establish a set of design criteria and guidelines, which provide for a uniform approach that result in a system of roadways with "consistent driver expectations" regarding appearance, operational performance, and quality of roadways. Accurate and consistent driver expectations are an important component in roadway safety.

3. Design speed.

To keep travel speeds and rural roads safe for all users, design speeds in the rural area should be the same as or slightly higher than the posted speed. However, in no case should the design speed be greater than 10 mph over the posted speed limit. Design speeds for County roads should never exceed 50 mph, and for most roads design speeds should fall within 25-40 mph. This is in keeping with the federal standards for design speeds for collector and local roads, the federal classification that most closely matches the roadway conditions in rural Caroline County.

Care should be exercised in selecting a design speed that is reflective of local conditions and driver expectations. In general, roads should not be designed to increase speeds. The following factors should be considered in establishing the roadway's design speed:

- Reduction of accidents.
- Facilitate farmers moving large equipment and hauling crops.
- Minimization of impacts to scenic, natural, or other resources.
- Conformance with the County's Comprehensive Plan.
- Maintenance of existing roadway alignment, and character.
- Accommodation of land uses and activities that border the road.
- Provide rural resident reasonable access to and from driveways.
- Minimization of roadway construction and maintenance costs.

The Maryland SHA's Interim Design Guide for Minor System Preservation Projects off the NHS states:

"Because most system preservation projects follow the alignment of the existing road, generally, the design will be the anticipated posted speed. The system preservation design speed should provide reasonable continuity with adjacent roadway sections where the character of the roadway and roadside is similar. Achieving higher design speed for short roadway sections is not desirable. In some cases, this might necessitate lowering a speed limit if achieving the desired speed is not practical. It is important to provide consistency on the route with the system preservation design speed."

4. Sight Distances.

The engineer designing a new road shall strive to provide sight distances for road and bridge projects equal to or exceeding those in accordance with the most current applicable AASHTO publications, while maintaining existing topography to the maximum extent possible.

Any improved roadway section should follow the existing horizontal and vertical alignment to the maximum extent practical. This is necessary in order not to create false driver expectations about safe travel speeds. The natural topographic characteristics of the views should be preserved and enhanced whenever possible.

Without sacrificing safety and maintenance concerns, grading should retain the natural contours of the land whenever possible while maintaining positive drainage away from the roadway to approved drainage facilities. Reconstructed sections of roadways should generally match the cross section of the existing road sections in order not to create false driver expectations about safe travel speeds unless there is an operational or functional need for a different cross section.

When curvature sharper than the AASHTO-recommended values is used, a post-construction test should be conducted, and the road posted accordingly. Any such posting of a road should follow the guidelines in the Manual for Uniform Traffic Control Devices (MUTCD).

5. Right of Way (ROW) widths.

A. New Roads.

For new roads (or new construction for extensions or connections to existing roads), it is recommended that design standards match the dimensions of the existing road with which the new road will connect. Standards should also help limit the amount of new impervious surface cover.

The addition of acceleration/deceleration lanes and bypass lanes should be avoided on rural roads except as required below. Where they are absolutely necessary, the length and width of an additional lane should be minimized to the greatest extent possible, and waivers requested from SHA as appropriate.

For all road improvements required for a development, the developer is responsible for the engineering, rights-of-way, grading, paving, signage, curb and gutter, and lighting costs.

B. Existing roads.

Where a new development has frontage along an existing road, the right-of-way to be dedicated shall be 10 feet beyond the edge of the existing bound of macadam paving.

The addition of acceleration/deceleration lanes and bypass lanes should be avoided. Where they are necessary, the length and width of an additional lane should be minimized to the greatest extent possible and waivers requested from SHA as appropriate.

County easement agreements should not have a right-of-way requirement more than 10 feet on either side of the pavement or 50 feet from any bridges, crossings, culverts or other drainage structures existing at the time of signing of the easement. In most cases the County is not given right-of-way in-fee but rather the right to enter. To comply with the goals of the easement, the right-of-way or right of entry should be limited to road maintenance and service, etc.

6. Residential driveway entrances (three or fewer lots/dwellings).

Requirements for residential driveway widths should be evaluated to avoid increasing impervious surface cover beyond what is necessary. Driveway entrances should provide for both traffic safety and the preservation of scenic and historic roadway character. Where left turn lanes are deemed to be necessary for safety reasons on the mainline road approaching a driveway, consideration should be given to adding a “bypass lane” in lieu of a full width left turn lane.

7. Private road entrances.

Requirements for private road widths should be evaluated based on the nature of the traffic, the volume, the operating speed of the County road, and other factors necessary for safe ingress and egress. This includes heavy truck traffic and/or vehicle axle weight. Where left turn lanes are deemed to be necessary for safety reasons on the mainline road approaching a driveway, consideration should be given to adding a “bypass lane” in lieu of a full width left turn lane.

8. Lighting.

Caroline County does not own or maintain streetlights or other exterior roadway illumination. If such illumination is determined necessary for public safety, lighting should be shielded and directed away from homes to preclude excessive lighting or glare that is inappropriate for the rural environment. Lighting fixtures should incorporate partial cut-off shielding to direct light downward so that the light emitted is projected below the horizontal plane through the luminaire's lowest light-emitting part.

9. Traffic barriers/guardrails.

Traffic barriers (i.e., guardrails) should only be installed in specific circumstances whereby a thorough roadside geometric safety review has been conducted and barrier warrants are met. Where warranted, the amount of guardrail used should be determined on a case-by-case basis and the length should be minimized in low accident and/or low-hazard situations.

10. Utilities.

Because rural roads are narrower, every effort should be made to limit the introduction of new, fixed structures in the roadway vicinity. Utilities should be placed or relocated to preserve or enhance the character of the rural roadway. The use of underground utilities is encouraged for both safety and aesthetics. Particularly in new road construction or where a trench is being dug for other purposes (e.g., fiber optics), efforts should be made to underground all utilities. Preservation and restoration of the scenic qualities of the roadway should be considered for all utility installation within the right-of-way.

Whenever possible, utilities should be consolidated and unnecessary poles removed. Overhead utility lines or replacements should be designed to place any required guy wires or similar supports as far from the roadway as possible with minimal impact to the surrounding area. Where overhead utility wires are near the roadway, only low growing vegetation should be planted underneath wires to reduce the need for periodic pruning. New utility wires should be carefully sited where they will not require excessive pruning of existing or proposed landscape features. Vertical clearances of overhead supply and communications wires, conductors or cables shall meet the requirements established by the State of Maryland.

Public utility easements (PUEs) should be located where they will result in minimal disturbance to identified scenic and historic qualities. The alignment of the PUE should be determined on a case-by-case basis at the time of development plan review.

11. Public involvement process.

Road and bridge work can have a profound impact on a rural area. To maximize the opportunity for public participation and minimize disruption to the traveling public, the County will:

- Provide notification of the project to the County Commissioners, Planning Commission, relevant community groups, as well as press releases to newspapers and notices on social media.
- Post signs at bridges before major rehabilitation or replacement projects.
- Notify the property owners adjacent to the project by mail.
- Provide information on the County's website.

ARTICLE III

Scope, purpose and intent

12. Scope.

This Manual shall apply to the design, construction, improvement, maintenance, and repair of all county roads, rights-of-way and easements as defined herein. This Manual shall also apply to all roads which are required to be designed, constructed, improved, maintained, or repaired by the Subdivision Regulations, the Zoning Ordinance, and/or the Roads Chapter of the Caroline County, Maryland, Code of Public Local Laws. The design considerations described in Article II of this Manual may be imposed as requirements by the Caroline County Commissioners, the Caroline County Planning Commission, the County Administrator, the Zoning Administrator, and/or the Director of Public Works as part of any permit approval process.

13. Title.

This Manual shall be known as the Caroline County Road Design Manual.

14. Purpose and intent.

This Manual is adopted for the following purposes:

- A. To protect and provide for the public health, safety, and general welfare of the citizens of Caroline County.
- B. To establish reasonable standards of design, construction and reconstruction for County roads in accordance with good engineering practices, to insure the safety of the traveling public, and to provide for the efficient use and expenditure of public funds.
- C. To establish reasonable standards of design and construction for new subdivision roads in accordance with good engineering practice, to insure the safety of the traveling public, to encourage high subdivision and development standards, and to minimize future public expenditures for maintenance and improvement of these roads after they are accepted into the county roads system for perpetual maintenance.
- D. The standards in this manual do not necessarily apply to the County's routine maintenance of its road system. Due to right-of-way and other physical and financial limitations, full compliance with these standards may not be possible absent full reconstruction of the road. For routine maintenance by the County's Road Division the standards of this Manual are established as goals rather than mandatory requirements. The County reserves the right to require any other entity building new roads, upgrading or reconstructing existing roads, or doing any other work related to the County road system to meet the standards herein.

15. Severability.

Should any section or provision of this Manual be declared by the courts to be unconstitutional or invalid, such decision shall not affect the validity of the Manual as a whole, or any part thereof, other than the part so declared to be unconstitutional or invalid.

16. Conflict with other provisions.

Whenever any provision of this Manual conflicts with any other provisions of law, whether set forth in this Manual, or contained in any law, code, rule, regulation, ordinance, deed restriction, or covenant covering any of the same subject matter, that provision which is more restrictive or which imposes the higher standard or requirement shall govern.

17. Authority.

This Manual is adopted under the authority of Public Local Laws of Caroline County, Maryland, Caroline County Road Regulations.

18. Penalties.

Any violation or failure to perform any duty under this Manual shall be a violation of the Caroline County, Maryland, Code of Public Local Laws and shall be subject to the penalties and enforcement procedures contained therein.

ARTICLE IV Definitions

19. Definitions.

For this Manual, the following definitions are provided:

AASHTO - American Association of State Highway and Transportation Officials.

Arterial road – A major road which provides connections between collectors and residential streets to the State Highway System (SHS). An arterial also provides access to abutting properties.

Collector road - A road which is intended to collect traffic from the residential streets within a neighborhood or rural village and to distribute traffic to arterials, in addition to providing access to abutting properties.

Construction Costs - Includes all labor, materials, equipment and incidental work, including that work required by other ordinances (i.e., storm water management, erosion and sediment control, subdivision regulations, etc.) required to accomplish the project improvements as shown on the approved project plans.

County – Caroline County, Maryland.

Cul-De-Sac – A road having but one end open for vehicular traffic and having a dedicated turnaround for vehicles.

Department - The Caroline County Department of Public Works.

Developer - An individual, partnership, or corporation (or agent thereof) that undertakes any development, construction, subdivision, or other work as covered under this Manual, the Caroline County Road Regulations, Caroline County Subdivision Regulations, Caroline County Zoning Ordinance, Caroline County Erosion and Sediment Control Ordinance, Caroline County Storm Water Management Ordinance, and/or any other code, law, ordinance or regulation. This term includes the terms "sub-divider", "developer", "applicant", "person", "permittee", "contractor" or other similar terms used in any of said ordinances.

Director - The Director of the Caroline County Department of Public Works or the Director's designee.

Department of Public Works (DPW) – The Caroline County Department of Public Works.

Easement – A strip of land for which a limited right has been granted for one or more specific purposes, but not including fee simple title to the land.

Engineer – A professional engineer employed by Caroline County or a professional engineering firm employed by Caroline County.

Haul road – A paved or unpaved road that provides access to trucks or heavy equipment and provides access to the State Highway System. Any portion of any County road may be designated a haul road by the Director of Public Works in consultation with the Director of Planning & Codes.

MUTCD - - Manual on Uniform Traffic Control Devices.

Passing sight distance – The distance required for a vehicle to pass another before meeting an opposing vehicle which might appear after the pass began.

Planning Commission – The Caroline County Planning Commission.

Private road - A road which serves no more than five (5) lots in a minor subdivision, unless specifically permitted by the Planning Commission and/or is not maintained by the County.

Public Utility – A business or service which is engaged in regularly supplying a commodity or service of public need such as electricity, gas, water, sewer, telephone, telegraph, or cable television.

Residential road - A road other than an arterial or collector intended primarily for providing access to abutting residential properties.

Right-Of-Way – A fee simple title or an easement for continuous access through, over, under and across property.

Roads Division – The Roads Division of the Caroline County Department of Public Works.

Rural access road (RAR) – A road which is intended to primarily provide access to agricultural land, woodlands, etc., and not residential or commercial areas.

Stopping sight distance – The distance required for a vehicle to stop before reaching an object in its path. It is the sum of the distance traveled from the moment the object is first visible to the driver to the moment the brakes are applied, and the distance required to stop after the brakes are applied.

Soil Conservation District – The United States Department of Agriculture, Soil Conservation District, in Caroline County.

SHA or State Highway Administration – The Maryland Department of Transportation, State Highway Administration.

Standards – Design and Construction Standards of the Department of Public Works and Roads Division adopted herewith, revised and amended from time to time by Resolution of the County Commissioners.

Street or road - A public or private right-of-way or thoroughfare intended for vehicular traffic whether designated as a freeway, expressway, highway, collector street, residential street, commercial street, avenue, land, circle, or rural road which affords the principal means of access to abutting properties.

Subdivision - Including the terms "Major Subdivision", "Rural Major Subdivision" and "Minor Subdivision", the division of a lot, tract or parcel of land into two (2) or more lots, plats, sites or other divisions of land as defined in the Caroline County Subdivision Regulations as may be amended from time to time.

Subdivision road - Any road providing access to all or part of the lots in a major subdivision or rural major subdivision, which will be created or improved by the sub-divider as an integral part of the development of the subdivision, as required by the Caroline County Subdivision Regulations.

Surety - Any form of security including bond, escrow, deposit, collateral, property, or instrument of credit, in an amount and form satisfactory to the County Commissioners. Such security is to guarantee the satisfactory completion, maintenance, and dedication of required improvements and facilities.

Unpaved road – A road without a hot mix asphalt or chip seal (tar-and-chip) surface course.

Use-in-Common Drive – A shared private road serving two or more residential dwellings.

Work – The creation of any new County road, right-of-way or easement, or any physical alteration within an existing county road, easement or right-of-way, including but not limited to: excavation, grading, demolition, drainage, repair, construction, structures, paving, and utility installation or modification.

All terms defined in the Caroline County Zoning Ordinance, Caroline County Subdivision Regulations, Caroline County Erosion and Sediment Control Ordinance, and Caroline County Storm Water Management Ordinance shall have the same meaning in this Manual unless specifically defined in this Manual.

ARTICLE V

General provisions

20. Connecting road.

No road, separated from a road belonging to the Caroline County Road System, or a road maintained by any other public agency, shall be improved and/or accepted by the Department of Public Works.

21. Developer-funded road improvements.

The developer is responsible for improving proximate, existing County roads to applicable standards if the proposed development or other new use of a property will impact the roadway as determined by the Director of Public Works in consultation with the County's engineer and the Director of Planning & Codes. The developer is further responsible for improving proximate, existing County roads to applicable standards if said road is determined substandard for the proposed new use as determined by the Director of Public Works in consultant with the County's engineer and the Director of Planning & Codes.

The Department of Public Works shall determine when an existing County maintained road must be improved and shall also determine the extent of required improvement pursuant to the authority of Chapter 152 of the Caroline County Code of Public Laws which may be amended from time to time.

22. Private road.

Residents located along a private road may request the road be taken in the County road system for maintenance by the County. The private road must meet current road standards before it will be accepted into the County system. Any improvements required to meet the current standard shall be at the cost of the residents located along the road. The Director of Public Works shall make the final decision as to the extent of improvements required.

ARTICLE VI

Functional classification.

23. Functional classification.

Rural Access Road – A road which is intended to primarily provide access to agricultural land, woodlands, etc., and not residential or commercial areas. A rural access road is normally unimproved, carries nominal vehicle traffic, and are not through roads.

Cul-de-Sac – A road having but one end open for vehicular traffic and having a dedicated turnaround for vehicles. Cul-de-Sacs primarily serve small residential areas or rural villages and may be unimproved or improved. Cul-de-Sacs carry nominal vehicle traffic and are not through roads, however, some roads may be designed as temporary cul-de-sacs allowing for future extension of the County road network into adjoining parcels.

Residential Road - A road intended to serve and provide access primarily to the residential or agricultural properties abutting thereon. A residential road normally connects to one or two collectors. Residential roads generally serve fewer than 25 properties.

Collector Road – A road which, in addition to providing access to properties abutting thereon, is intended to collect light traffic from, or distribute it to, a series of roads within a neighborhood, and may connect to an arterial or to the State Highway System. In a subdivision, any road which serves not more than fifty (50) lots may be classified as a collector road.

Arterial – A road which, in addition to providing access to properties abutting thereon, is intended to move a traffic volume between neighborhoods, rural villages, or between one area of the county to another.

Haul Road – A paved or unpaved road that provides access to trucks or heavy equipment and allows a route to the State Highway System. Any portion of any County road may be designated a haul road the Director of Public Works in consultation with the Director of Planning & Codes.

ARTICLE VII Minimum Design Requirements.

Caroline County Public Works Department Rural County Road Standards

Road Type	Class	Travel Width	ROW Width	Min. Posted Speed	Design Speed	Min. Horizontal Radius	Pavement Section	Int. Sight Distance	Stopping Sight Dist.
Rural Access Road	R0	18 feet	24 feet	NA	NA	NA	Unpaved	Note 1	Note 1
Cul-de-Sac	R1	20 feet	30 feet	25	25	160	TC3	Note 1	Note 1
Residential Road	R2	22 feet	40 feet	30	30	200	TC3	Note 1	Note 1
Collector Road	R3	22 feet	50 feet	35	35	375	HMA 5 or TC3	Note 1	Note 1
Arterial Road	R4	24 feet	60 feet	45	55	AASHTO	HMA 6	Note 1	Note 1
Haul Road	H	20 feet	40 feet	25	25	240	FDR or HMA	Note 1	Note 1

Note 1 - Calculated using AASHTO Green Book

24. Criteria.

This article presents criteria and guidelines for the design of roads. The criteria and guidelines have been developed considering the intended role of the road in relation to service function, land use, traffic demand, quality of service, vehicular and pedestrian safety, economy and the environment.

25. Continuity.

When a road is constructed in segments at various times or traverses areas of varying character, the Director of Public Works may require certain design criteria or features not otherwise required by this Manual or may waive these design features in order to provide continuity of the typical section. The

Director shall not grant any waiver of any feature or specification which might reduce the safety or the structural integrity of the road.

26. Design Controls

The basic design criteria on Table 1 assume typical road and traffic conditions. Since not all conditions will conform to these typical standards, the County's engineer, with the approval of the Director of Public Works, may apply design controls to a specific situation on a determination that this is the best engineering practice.

The three principal values controlling design of roads and streets are average daily traffic volume (A.D.T.), design speed, and design vehicle. These values form the basis for the selection of the geometric elements that are required to accommodate the anticipated traffic at a desired quality of service.

A. Average Daily Traffic Volume (ADT)

Average daily traffic volume will be the primary design control in most situations. In cases of lower classification roads, trip generation rates may be used in lieu of average daily traffic.

B. Design Speed

Design speed is the maximum safe speed that can be maintained over a given section of road when the traffic volume is so low that the geometrics of the roadway control speed. All elements should be in balance consistent with a specified design speed. Stopping sight distance, horizontal and vertical alignment and super-elevation are among the roadway elements which are controlled by design speed. The minimum design values for the various elements required for a given design speed should be used only where controls such as topography and property damages dictate their use. However, on local residential roads, it is desirable to keep speeds low and care shall be exercised that the design does not encourage high speeds without sacrificing any of the design standards included herein. Unless otherwise approved by the Department, the minimum design speeds listed in Table 1 shall be used for the design of roads.

C. Design Vehicle

The design vehicle is the motor vehicle whose characteristics determine such geometric elements as vertical clearance and turning radii. Design vehicle axle weights also determine the appropriate structural design of a new road or the reconstruction of an existing road.

Although a road must be designed to accommodate the largest vehicle likely to use it, the selection of too large a design vehicle can have an adverse effect, such as longer crosswalks at intersections. The design vehicle shall be selected considering the road classification and adjacent land uses. Its selection is subject to approval by the Department. All County roads shall be designed to safely accommodate emergency vehicles such as fire trucks and ambulances and agricultural equipment and vehicles.

ARTICLE VII

Minimum Design Requirements.

27. Geometric design principles.

The geometric design of roads includes general layout, alignment, grades, surface widths and composition, shoulder widths and composition, and drainage. If an item is not covered by this subtitle, the engineer shall refer to the latest edition of the AASHTO publication "A Policy on Geometric Design of Highways and Streets" and SHA Specifications.

Roads should be designed to take full advantage of the existing topography and offer scenic views wherever possible. The horizontal and vertical alignment should be designed together to assure a smooth continuous route. Design procedures which include the careful coordination of the vertical and horizontal alignment will result in a safer, more aesthetic and more economical design. The horizontal curve should be longer than the vertical curve at a given location so that the driver can easily perceive changes in horizontal alignment. The design, both horizontal and vertical, should be such that no unexpected features are presented to the driver.

28. Effective and efficient development.

All road layout shall be designed to obtain the most effective and efficient development of the site and adjoining areas.

29. Recognition of features.

All road layout shall give respect existing topography and attempt to preserve trees, provide for good drainage, develop natural building sites, and provide a safe and efficient travel pattern, without loss of natural aesthetic value.

30. Alignment and elevation.

When determining alignment and elevation of traffic ways, the engineer shall consider the requirements for utilities, including storm drainage facilities where required and any unusual aspects of the design such as railroad crossings and other features.

31. State Highway Administration (SHA) standards.

All construction and materials required by this subtitle shall be in accordance with the SHA specifications unless stated otherwise herein.

32. Intersections

A. As nearly as possible, streets shall intersect each other at right angles. Unless otherwise approved by the County, the angle of an intersection may not be less than 70 degrees. The number of intersections of residential, collector, and other County roads shall be kept to a minimum.

- B. Intersections with State roads and County arterial roads shall be spaced at intervals in accordance with SHA policies. Corner sight distances are specified in Table 1. Roads should be so located that sufficient length is provided between intersections for weaving and storage of vehicular traffic.
- C. The curb radius at intersections shall be a minimum of 30 feet. In commercial areas, the curb radius at intersections shall be a minimum of 30 feet and desirably should be a parallel curve of sufficient radii to accommodate the largest vehicles expected. Intersections shall have right of way radius fillets of 25 feet.
- D. Access to State roads must be approved by the Office of Engineering Access Permits Division of SHA.
- E. Acceleration and deceleration lanes at an entrance to a proposed development or use may be required based on vehicle volume and the design vehicle parameters.

33. Horizontal curves.

Horizontal curves are used to change direction at a safe rate and shall be used wherever the roadway centerlines change direction.

- A. Where road centerlines change direction, they shall be connected by a horizontal curve with a radius to insure a minimum horizontal sight distance in accordance with Table 1.
- B. The minimum length of a horizontal curve shall be 100 feet.
- C. Street alignment in commercial areas should be commensurate with the topography but shall be as direct as possible.
- D. A tangent of at least 100 feet shall be used between reverse curves except in unusual situations.

34. Vertical Curves.

To avoid abrupt change in vertical alignment when passing from one grade to another, a vertical curve shall be used at the grade intersection. When the absolute value of the grade change is less than or equal to one percent, no vertical curve shall be necessary.

- A. On sag curves, the minimum vertical curve length shall be governed by criteria set by AASHTO for headlight sight distance. A sag vertical curve shall be long enough so that the light beam distance is the same as the stopping sight distance. Minimum stopping sight distances shall be in accordance with Table 1.
- B. On crest curves, the minimum vertical curve length shall be determined by the criteria set by AASHTO for minimum lengths of crest vertical curves as determined by stopping sight distance. Minimum stopping sight distances shall be in accordance with Table 1.

35. Grades.

The maximum allowable grade on any road shall be 6%. The minimum allowable grade on any road shall be 0.5%. At an intersection of two roads or streets, the normal typical section of the priority street shall continue through the intersection without a break. The crown of the other street shall be warped from its normal section to connect to the edge of the priority street. Where two streets of equal importance intersect, both street crowns shall be warped from their normal section so that the centerline elevations of both streets are identical at the intersection.

Unless otherwise specified, the grade from the crown of the roadway to the edge shall be two (2) percent and the grade of the shoulder from the edge of the roadway to the edge of the shoulder shall be three (3) percent. All roads and shoulders shall be graded to provide positive drainage from the road to the ditch or gutter flow line.

36. Super-evaluation and warping.

Horizontal curves of residential roads shall not be super-elevated or warped unless directed by the Engineer. Horizontal curves of collector and arterial roads shall be super-elevated in accordance with AASHTO criteria or as directed by the Engineer.

37. Sight distances.

Vertical and horizontal curves shall be designed for at least the minimum stopping sight distance. Design for passing sight distance is not applicable on commercial or residential streets but shall be provided at least once every mile on collector roads.

38. Cul-de-Sac roads.

Cul-de-Sac roads which are permanently designed with only one (1) end open to vehicular traffic shall be terminated in a cul-de-sac. In the event a road may be extended in the future, a temporary turn-around shall be provided (see Figure 2).

39. Roadway islands.

The County will not approve any plan for a new subdivision road proposed for acceptance into the County roads system if the proposed road contains a traffic island. In order for any existing road containing a traffic island to be accepted into the County roads system, a legally binding "perpetual maintenance agreement" shall be executed between the County and property owners, or between the County and a bona fide property owner's association, establishing the responsibility of the property owners or of the association for the maintenance of the traffic island, which responsibility shall attach to all subsequent owners of the property.

40. Interpretation of standards.

The standards, specifications, and requirements of this Manual shall be construed as minimum requirements. The Director shall have the authority to interpret this Manual. Interpretations by the Director may be appealed to the County Commissioners.

ARTICLE VIII Cross Sections.

41. Typical cross sections.

Typical cross sections for County roads are maintained by the Caroline County Public Works Department. A table of technical requirements by road type is provided below:

Road Type	Class	Sub-base	Base	Surface
Rural Access Road	Unpaved	4" CR-6	NA	NA
Cul-de-Sac	TC-3 ¹	6" CR-6	NA	3x chip seal
Residential Road	TC-3	6" CR-6	NA	3x chip seal
Collector Road	TC-3	6" CR-6	NA	3x chip seal
Collector Road Alt	HMA-5	6" CR-6	3" base HMA ²	2" surface HMA ³
Arterial Road	TC-3+	8" CR-6	Soil cement add	3x chip seal
Arterial Road	HMA-6	8" CR-6	4" base HMA ²	2" surface HMA ³
Haul Road	TC-3+	10" CR-6	Soil cement add	3x chip seal
Haul Road	HMA-6	10" CR-6	4" base HMA ²	2" surface HMA ³

¹ Minimum 1.4 gallons of CRS2 asphalt & 90 pounds of #8 crushed limestone per square year per layer of chip seal.

² Base hot mix asphalt, 12.5mm Superpave

³ Surface hot mix asphalt 9mm Superpave

All sub-base compacted to at least 95% of modified proctor density

All unsuitable subgrade removed as directed by engineer or County inspector

Additional sub-base, base, and/or surface may be required as determined by engineer or County inspector

42. Structural elements.

Roadway pavement widths, depths, and cross-slopes shall be as shown on the typical cross sections. Paving or surface type and subbase composition and depth shall be subject to final determination by the County Engineer depending on field conditions.

GAB = Graded aggregate base normally crusher run aggregate CR-6. CRUSHER RUN AGGREGATE CR -

43. Curb and gutter.

County roads are normally open section without concrete curb and gutter. Curb and gutter may be required in residential subdivision, on the frontage of commercial or industrial lots, where required by SHA, or where the Director of Public Works determines that curb and gutter is in the County's interest.

44. Shoulders

Shoulders shall be as shown on typical sections. Aggregate shoulders shall be compacted to the specification provided by the County Engineer. Unless otherwise specified, compacted aggregate

shoulders shall extend at least twenty-four (24") inches beyond the edge of the macadam or tar-and-chip roadway surface.

45. Side slopes.

Side slopes for excavations and embankments should be as flat as practicable considering earthwork and right-of-way requirements. The normal maximum slope shall be 3:1. Where poor soil conditions exist, soil tests and a slope stability analysis shall be conducted to determine an acceptable slope. All side slopes shall be stabilized with vegetation.

46. Guardrail

Per Section 9, traffic barriers (i.e., guardrails) should only be installed in specific circumstances whereby a thorough roadside geometric safety review has been conducted and barrier warrants are met. Where warranted, the amount of guardrail used should be determined on a case-by-case basis and the length should be minimized in low accident and/or low-hazard situations.

Where practicable, the embankment should be adjusted to eliminate the need for guardrail. Where guardrail is warranted, it shall be placed as shown on the typical sections and shall conform to SHA standard details and specifications.

47. Utilities.

Utilities should be located per the guidelines in Section 10. Where conditions are such that these guidelines cannot be met, an alternate shall be developed and submitted to the Director for review and approval in consultation with the County Engineer. All utility owners shall have their plans for utility installations or modifications approved by the Department before any construction work is commenced within the right-of-way of an existing or proposed county road.

48. Obstructions and hazards to traffic.

No obstructions, including but not limited to lights, posts, signs, fences, trees, or shrubbery shall be placed on or within the County right-of-way without the written permission of the Director of Public Works. Mailboxes may be placed within the right-of-way without prior written approval. Mailboxes placed in the right-of-way shall be constructed of lightweight materials and mounted on wood posts no greater than four (4) inches in diameter. Mailboxes shall not obstruct sight distances, interfere with road or right-of-way maintenance, or constitute a safety hazard to traffic or other persons, and should be set a minimum of four (4) feet from the edge of the pavement.

Any sign, fence, tree, or shrubbery placed on private property abutting a road right-of-way shall be located a minimum of ten (10) feet behind the right-of-way line to provide for a safe sight distance, allow for ease of drainage maintenance, and to prevent any damage to private property while performing road maintenance activities.

Irrigation systems while operating shall not cross or enter upon the road or right-of-way. Spray from irrigation systems shall not fall upon the road or right-of-way unless a pre-existing right-of-way agreement exist.

ARTICLE IX Entrances.

49. Entrances.

To obtain uniformity and maximum safety, the design and location of commercial and industrial entrances shall be in accordance to the standards set forth in the "Rules and Regulations for Commercial, Subdivision, Industrial, and Residential Entrances to State Highways" of the Maryland State Highway Administration. The requirements for residential entrances shall be established by the Director, in consultation with the County Engineer and Director of Planning & Codes.

The maximum grade of any entrance shall be five (5) percent. Maximum back slopes at entrances shall be 3:1. If an entrance to any property is damaged during construction on that property, the developer shall immediately notify the Department of Public Works. Any entrance damaged during construction shall be repaired or replaced prior to the issuance of a certificate of occupancy.

50. Access permit required.

All new entrance or improved entrances onto a County road require an access permit per Chapter 152 of the Caroline County Code of Public Laws as may be amended from time to time.

51. Entrance culverts and drainage.

The requirements for entrance culverts and drainage are described in Article X of this Manual. The shape and length of culverts, and the grading of culvert inlets and outlets shall be designed to facilitate periodic maintenance to remove obstruction.

ARTICLE X Stormwater & Drainage.

52. Compliance with County Code.

All stormwater and drainage shall comply with Chapter 158 of the Caroline County Code of Public Laws as may be amended from time to time.

53. General requirements.

In the absence of curb and gutter, a stabilized drainageway shall be provided outside the shoulder, conforming to the standards of cross-section and construction specified by the Director. Every residential subdivision, commercial and industrial shall be provided with a storm drainage system. Storm water runoff is to be collected and conveyed in closed conduit systems (inlets, pipes and connectors) and open channel systems (ditches, streams, culverts, rivers, improved open channels). Property owners adjoining a County road shall not change the existing topography, grade, or drainage in such a way that increases the conveyance stormwater onto the County road.

54. Improvements to existing systems.

Existing storm drainage system(s) which are determined inadequate to accommodate the proposed development shall be improved prior to development. Such determination shall be made by the Director in consultation with the County Engineer.

55. Changes to natural drainage.

Changes to the limits of natural drainage basins are prohibited and in general, runoff after development shall drain to the same outfall as before development. Compliance with this requirement will be made by the Caroline County Department of Planning & Codes in accordance with the provisions of Chapter 158 of the Code of Public Local Laws of Caroline County, as amended from time to time.

56. Stormwater system design.

In the design of a storm drainage system, the present runoff and future runoff from the development and from the area draining thereto shall be determined based on full development of the watershed in accordance with current zoning for the area. A registered Professional Engineer shall design the storm water system in accordance with the County Code and best management practices and shall certify that the system is adequate to collect and convey stormwater runoff from the development and any area contributing thereto, and shall attest to the effects of the storm water runoff to neighboring lands. The storm drainage system shall include both on-site and off-site structures and improvements as needed.

57. Stormwater plans.

In addition to any requirements of Chapter 158, Stormwater Management, the following data shall be submitted:

- A. A map at a scale not smaller than 1" = 200' showing the areas draining to each element of the proposed storm drain systems of the development.
- B. A plan showing the facilities to be provided along with flow data and computations developed in the design and the tentative layout of the drainage facilities.
- C. Runoff calculations and assumptions shall be provided in acceptable format for both closed and open systems, giving area, size, quantity, velocity, slope and depth of flows, and hydraulic gradient.
- D. For development with open systems, the sizes of driveway culverts shall be shown on the construction plans.

58. Stormwater design criteria

The provisions of Chapter 158 shall be used to determine quantities of storm water runoff.

The minimum length of any roadway or entrance, culvert or storm drain shall be 24' in residential areas and 40' to 60' in commercial or industrial areas. Any entrance serving more than one lot or parcel of land shall be required to be 40' in length. The final determination for the length for a commercial or industrial entrance culvert shall be made, on a case-by-case basis, by the Director of Public Works.

The minimum diameter of any pipe or culvert shall be 15" (round type) or 13" x 17" (arch type).

A minimum of six (6) inches of base material shall be between a storm drain pipe and the surface material in a private driveway, and at least twelve (12) inches in a public street or roadway.

59. Closed stormwater management systems.

Closed runoff systems shall be required where curb and gutter road sections are required. Wherever possible existing natural drainageways shall be preserved as a supplementary element to closed drainage systems. In all cases, closed systems shall discharge into existing natural drainage-ways as soon as is practicable. The requirements for closed runoff systems shall be determined by the Director in consultation with the County Engineer and the Department of Planning & Codes. Easement requirements shall be determined by the Director in consultation with the County Attorney.

60. Open stormwater management systems.

Where development density is equivalent to one (1) dwelling unit or less per acre, and the existing or modified natural channels can safely handle storm water runoff, an open system utilizing drainage ditches, culverts, and natural channels may be utilized. In certain cases, where quantity of flow, topographic, soil or natural channel conditions preclude open systems, then the system shall be fully or partially enclosed as required. The requirements for open runoff systems shall be determined by the Director in consultation with the County Engineer and the Department of Planning & Codes. Easement requirements shall be determined by the Director in consultation with the County Attorney.

ARTICLE XI Vegetative Stabilization

61. Vegetative stabilization.

This section is additional to any requirements for vegetative stabilization or planting as required by the County's Erosion and Sediment Control Ordinance, the Caroline County Soil Conservation District or any other applicable code, law, regulation or ordinance.

All areas of disturbed soils within the road right-of-way or associated work shall be covered with at least two (2) inches of topsoil and stabilized with vegetation by and seeding and mulching to establish a thick stand of permanent grass. The developer shall be responsible for the vegetative cover for one (1) full growing season or for one (1) year from the date of planting, whichever is longer. During this time period the developer shall be responsible for any additional grading, placement of topsoil, seeding, planting, mulching, watering, or any other activity necessary to successfully establish a healthy vegetative cover over the entire disturbed area. The Director may require additional stabilization measures such as erosion control matting (Curlex fabric).

ARTICLE XII Signage

62. Authority and Manual of Uniform Traffic Control Devices (MUTCD)

The Caroline County Department of Public Works has the authority and responsibility for design, placement, operation, maintenance, and uniformity of traffic control devices in its jurisdiction. In placing roadway signs, the Department of Public Works shall follow the Manual on Uniform Traffic Control Devices for Streets and Highways, most recent edition, as published by the U. S. Department of Transportation, Federal Highway Administration, and other standards issued by or endorsed by the Federal Highway Administration.

63. County control of roadway signage.

Only authorized Department of Public Works personnel shall erect or remove signs from the right-of-way of County roads. Requests for erection or removal of signs shall be directed to the Department, including the reason for the sign and the desired location.

The Department of Public Works may remove any sign that can misdirect and confuse motorists or which conflicts with the Maryland Vehicle Law, Subsection 21-205.

A developer shall pay to the Department of Public Works in advance the cost for the initial installation of all necessary signs because of the development activity or work.

64. Private signs in County right-of-way.

Advertisements, announcements, and any other signs within the right-of-way shall be placed only with advanced permission by Department of Public Works.

65. Temporary traffic control devices.

Contractors, utility companies, and others desiring placement of temporary traffic control devices in work zones must obtain advance permission from the Department of Public Works. Such traffic control devices shall conform to the most recent edition of the Manual on Uniform Traffic Control Devices.

66. Signage for new roads and intersections.

Road signs of a design approved by the Director shall be erected at each new road or road intersection at the expense of the developer. Road name signs shall also conform to the Manual of Uniform Traffic Control Devices (MUTCD), latest edition. Proposed road names shall be submitted to the County Planning Commission for approval. Names shall not duplicate or closely resemble existing road names.

67. County road identification sign colors.

Roads owned and maintained by the County use white lettering on a green background. Private roads signs use white lettering on a blue background.

ARTICLE XIII

Permits & Construction

68. Permits.

No person shall work within a County right-of-way without first obtaining a permit from the Department. Failure to obtain a permit is a violation of this Manual. Any permit may be revoked if there is any violation of any provisions thereof or this Manual. Failure of a developer to immediately cease all work after receiving notice of such revocation shall be deemed a violation of this Manual. Before a permit is issued, all requirements for application, bond, fee, plans and right-of-way shall be met. The permit term may be extended only upon written approval by the Director. The developer shall submit a written request for the extension to the Director stating the reasons for the requested extension.

69. Permit application.

Application for permit shall be made on forms provided by the Department. When required by the Department, the permit shall be accompanied by special specifications peculiar to the scope of work covered by the permit and suitable drawings or detailed plans of the work.

70. Permit fees.

The County Commissioners shall adopt by Resolution a schedule of fees for permits, reviews, inspections, tests, and other services under this Manual. The County Commissioners may from time to time amend this schedule of fees as they see fit.

71. Right-of-way.

If any development is proposed to abut a road which has an existing right-of-way that is less than standard width required by this Manual, the developer shall dedicate to the County the additional right-of-way and slope easements necessary to obtain the required standard width.

72. Public utility work

The permit requirement for work within the right-of-way of a County road shall apply to the installation or modification of public utilities (gas, electric, telephone, cable television, water, sewer, etc.).

73. Roadway cuts.

Roadway cuts shall be approved only after receipt of acceptable proof of need. Permission for roadway cuts shall only be granted when determined necessary by the Director. In case of a public utility emergency, a pavement cut is authorized without prior approval. Written notice of the action taken together with a description of the emergency shall be given to the Department as soon as possible but not later than 12:00 noon on the next working day after the emergency is discovered.

In case of any cut into the surface of any county road, the public utility, person, corporation, or organization making it shall be responsible for restoring the road base and surface according to SHA Standard Details, and shall also be responsible for repairing any subsequent paving failures and settlements due to the cut. Repairs to cut areas shall be made in conformity with SHA Standard Details.

ARTICLE XIV Bonds.

74. Bonds

Any requirements for bonds under this section shall be in addition to the bonding or guarantee requirements of the County's Subdivision Regulations or any other applicable code, law, regulation or ordinance. The term "bonds" as used herein shall include any other form of guarantee acceptable to the Director and the County Attorney. This may include but is not limited to irrevocable letter of credit. The use of cash escrow funds is not permitted for purposes of a guarantee. All conditions and requirements which apply to a bond shall also apply to any other such form of guarantee. The developer, or its agents, shall save harmless Caroline County from any expense incurred through the failure to complete the work as required by this Manual, or from any damages growing out of their negligence.

75. Bond requirement amounts.

The following chart describes bond requirements by type of work:

Single-family residential entrance	None
Residential subdivision roads	115% of construction cost
Multi-family residential entrance	115% of construction cost
Commercial entrance	120% of construction cost
Industrial entrance	125% of construction cost
Haul road entrance	125% of construction cost
Public utility work (blanket permit)	None
Public utility work (no blanket permit)	150% of construction cost
Construction contract	100% of contract amount
All other work	Director determination

No work shall be started or permit issued until the required bonds have been submitted to and approved by the Director and County Attorney. Bonds shall remain in full force and effect until final acceptance of the work plus five (5) years from the date of final acceptance.

76. Bond corrective action.

The bonds shall provide for corrective actions during the bond duration period including the complete repair, restoration, replacement, or any other corrective action as required by the Director. The Director may invoke this requirement upon a determination that the work does not meet the plans and specifications or the requirements of this Manual, or that the work has failed during the duration period of the bonds. Upon expiration of the duration period of the bonds the Department shall make a final inspection of the work, and if satisfactory, shall certify the performance bond as being discharged.

77. Construction plans.

In addition to the requirements for plan submission in the Caroline County Subdivision Regulations, Caroline County Storm Water Management Ordinance, Caroline County Erosion and Sediment Control Ordinance, and any other applicable code, law, ordinance, or regulation, the developer shall have prepared and submitted to the Department suitable plans of the proposed work which conform to the following:

- A. **Proposed Grade** - The proposed road plan view shall show the adjacent properties with lot and tax parcel designations and topography. The profile section shall show the proposed grade with vertical curve information, curb fillet profiles, and existing ground lines at the centerline, and both right-of-way lines.
- B. **Storm Drainage** - The storm drainage plan shall show all storm drainage facilities in plan and profile, as well as property lines, ditch lines, curb lines, utilities, ground profiles, and other pertinent features. Complete design data shall be submitted for all storm drainage.
- C. **Paving Plans** - Paving plans shall show right-of-way, road names, dimensions, topography, location map, north point, scale, coordinates, datum, survey controls, curb and gutter, sidewalks, driveways, types of paving, location of present and proposed inlets with their gutter elevations, and sufficient elevations at all road intersections on the curb, gutter, and paving to assure adequate drainage of the intersection. Profiles of the curb and gutter at intersections may be required. Include typical pavement sections, grading plans, driveway profiles, and ground cross-sections, as appropriate.
- D. **Quantity and Cost Estimates** - The design engineer shall provide quantity and construction cost estimates. These estimates shall include all quantities for grading, paving, curb and gutter, etc. and shall be tabulated as directed.
- E. **Additional Data** - The Department may require any necessary additional data pertinent to the scope of the work.

78. Plan review and approval.

Approval of the plans of the Director shall be indicated by signature on the plan sheet. Plans may be approved for various phases such as profile grade, storm drainage, and paving details. All plans submitted for approval shall be prepared and signed by a Professional Engineer registered to practice in Maryland.

79. General construction standards.

All work shall conform to current standards and specifications of the Maryland State Highway Administration. Earthwork shall include clearing and grubbing, the removal and replacement of all unsuitable material, and the proper preparation of subgrade. Where necessary, adequate underdrains shall be installed. No work on road pavement shall be started until all underground utilities proposed to cross said road have been installed and properly backfilled. All materials used in construction shall conform in every detail to County and SHA standards and specifications or as otherwise approved and accepted in writing by the Department.

80. Maintenance of traffic and safety.

The developer shall be responsible for the maintenance of vehicular and pedestrian traffic on the road, and shall provide materials, labor and equipment as necessary to properly maintain traffic. Excavations or other hazards shall be properly barricaded at all times and lighted at night and proper connections shall be made to drives and walks at occupied residences. The developer is required to keep the road shaped up by blading, as necessary, and to correct muddy or soft subgrade by placing temporary gravel or stone. The developer is responsible for plowing snow sufficiently to maintain access to inhabited residences or other facilities until the road is formally accepted by the County Commissioners. It shall be the responsibility of the developer to remove any dirt and debris deposited on any county road as a result of the construction activity.

**ARTICLE XV
Inspections**

81. Inspections.

All construction work or improvements approved or permitted under this Manual shall be subject to inspection by the Department. The Department shall conduct inspections according to the following schedule:

- A. Pre-construction, before any work begins.
- B. Upon completion of sub-grade preparation and before placing bank run gravel or base material. (Notify Department 72 hours in advance).
- C. Upon completion of the base, and before placing surface or pavement. (Notify Department 72 hours in advance).
- D. As surface or pavement is being applied.
- E. As drainage work progresses.
- F. Prior to placing any cast-in-place concrete. (Notify Department 72 hours in advance).
- G. Upon final completion.
- H. At the end of the extended bond duration period (see Section 6.3.c).

82. Notice.

It shall be the duty of the developer to keep the Department apprised of the progress of the work and notify the Department of the need for an inspection. The developer shall not undertake any work beyond until required inspections have been completed. The Department may order that any work done without an inspection be removed and redone at the developer's sole expense.

83. Testing

The Director may conduct any tests deemed necessary to ensure that the work complies with the standards, specifications, plans, and any conditions of the permit or approval. Such tests may include but are not limited to compaction tests, material tests, sample work, slump tests, etc. The Department may order tests by an independent testing laboratory, the costs of which shall be billed directly to the developer.

ARTICLE XVI
Approval and Acceptance

84. Final Approval and Acceptance

The Department shall have the authority to approve or reject all work under this Manual. When the Department is satisfied that the work has been completed in accordance with the plans, specifications, and permit, the Department shall certify this to the County Commissioners. Actual acceptance into the County roads system for perpetual maintenance shall be only by Resolution of the County Commissioners in each individual case.

85. Partial Approval

Final approval of a part of the work may be approved by the Department only upon a finding of extenuating circumstances. However, the full amount of the bonds shall remain in effect for the entire work until expiration of the extended term of the bond for all of the work. All of the work, regardless of when the partial approval is granted, shall be subject to corrective action by the developer until expiration of the extended bond duration period for all parts of the work.

In the event of a partial approval of work which includes a road, the County Commissioners shall not accept any part of the roads into the County roads system for perpetual maintenance until all of the roads in the work have been certified for acceptance by the Department.

86. As-Built Drawings

After final approval but prior to final acceptance, two (2) complete sets of as-built drawings shall be professionally prepared and delivered to the Department; with one set of plans being in electronic format acceptable to County specifications and the other in paper form. No bonds shall be released until the as-built drawings are received by the Department.

ARTICLE XVII

Variances

87. Variances.

The County Commissioners may grant a written variance from any requirement of this Manual if there are exceptional circumstances applicable to the site such that strict adherence to the provisions of this Manual will result in unnecessary hardship and not fulfill the intent of the Manual. A written request for variance shall state the specific variances sought and reasons for their granting. All variances shall adhere to good engineering practices and may not endanger the public health, safety or welfare.

History:

- Resolution #2017-035, December 19, 2017; Previous Repealed and Replaced in its Entirety