

RURAL ROADS STANDARDS

DESIGN STANDARDS AND POLICIES FOR RURAL BALTIMORE COUNTY ROADS

MAY 15, 2008

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I. INTRODUCTION

The purpose of this guide is to provide design standards for county roads and bridges within Baltimore County's rural conservation zones. Development of design standards tailored for roads outside the Urban Rural Demarcation Line (URDL) is called for in several sections of the county's *Master Plan 2010*, most notably in the Transportation section for the Rural County.

Since the road network, like water and sewer service, plays an essential role in shaping and containing growth, it is important that road planning and design be compatible with land use and zoning. All land outside the URDL has a rural conservation zoning classification, and within this area lies more than 50,000 acres of agricultural and resource land protected from development through a variety of preservation easements. It is essential that transportation needs be addressed on the major roads and that special care be taken in the design of roads outside the URDL to preserve the rural character of both the roads and the communities. In keeping with this change in the public's philosophy from the 1900's when it was desired that unpaved roads be paved and widened, it is no longer the intention of Public Works to widen roads. Emphasis is placed on maintaining roads and retaining their existing character and design. Over the last 30 years only 8 capital projects have been completed for safety improvements. If a capital road project is necessary, the Department of Public Works will follow the procedures for community involvement listed in these standards.

The transportation system within the rural county largely consists of a road network that was developed at a time when all of Baltimore County was rural. In keeping with the rural tradition, these roads are usually narrow two lane roads without shoulders. They have not been engineered to improve sight distance or capacity, but rather hug the natural terrain. The rural quality of the road network reinforces and contributes to the rural character of the landscape. Newer rural residential development has resulted in the creation of subdivision roads, which are frequently wider than the rural road they feed into. In addition, commuters living in neighboring jurisdictions overburden roads that were never designed for such intensive use.

The county's rural areas are subject to increased traffic due to development beyond the county's jurisdiction and its location between urban areas. Increasing the capacity of the existing local road network would result in erosion of rural character and could increase development pressure. Alternate solutions to this situation should be investigated.

Ref: Ref: Baltimore County Master Plan 2010_

A. Community Involvement

The process for public involvement for a full replacement bridge or road project (such as repaving, widening, or new construction) will include the following measures:

- In the concept phase and the early stages of planning the County will provide notification of the project to the district councilman, the Planning Board, relevant community groups, as well as press releases to newspapers;
- Consult with the appropriate council member and set a public hearing, if requested;
- One or more signs will be posted at bridges for major rehabilitation or replacement projects;
- The County will notify the property owners adjacent to the project by certified mail;
- The County will include information in its e-newsletter which is available to anyone by subscribing on the County's website; and,
- An annual informational meeting will be held in one of several different rural communities, on a rotating basis, to discuss upcoming projects.

A central theme in both recent legislation and publications is the encouragement of meaningful involvement of the public and others as a project is being developed....A primary goal of those within the transportation agency involved in project development should be to understand the context of the project area.

A Guide for Achieving Flexibility in Highway Design, AASHTO, May 2004

II. DESIGN CONSIDERATIONS FOR RURAL ROADS

The design considerations of roadways 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, right-of-way needed, etc. Road design is accomplished through the application of these design criteria and guidelines. 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" with regard to appearance, operational performance, and quality of roadways. Accurate and consistent driver expectation is an important component in roadway safety.

A. Design Speeds

Design speed is a selected speed used to determine the various geometric features of the roadway. The assumed design speed should be a logical one with respect to the topography, anticipated operating speed, the adjacent land use, and the functional classification of the highway.

A Guide for Achieving Flexibility in Highway Design, AASHTO, May 2004

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. In keeping with design standards recommended in this report, design speeds 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 Baltimore County.

For all construction on rural roads the following criteria apply:

Baltimore County Rural Roads Criteria		
Rural Classification	Design Speed	
	Min	Max
Rural Local (Fed Class)	25	35
Rural Minor Collector (By Use)	30	40
Rural Minor Collector (Fed Class)	30	40
Rural Major Collector (Fed Class)	40	50
Rural Minor Arterial (Fed Class)	40	50

In rural Baltimore County, great 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:

- Avoid and/or minimize impacts to historical, architectural, scenic, natural or other resources;
- Comply with the county's master plan;
- Maintain the existing alignments, dimensions, and character;
- Account for land uses and activities that border the road;
- Consider the use of the road by pedestrians, cyclists, and equestrians;
- Reduce accidents;
- Allow for use by farmers moving large equipment;
- Provide rural residents reasonable access to and from their driveways;
- Develop low cost techniques that slow traffic down and allow the retention of existing dimensions and characteristics; and,
- Avoid excessive construction 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.”

Special care should be taken to achieve low speeds on rural roads with special designations (i.e., scenic roads, roads within rural legacy areas, and roads within historic districts), as well as roads bordered by significant properties under historic or conservation easements.

B. Sight Distances

The designer shall make a reasonable effort 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.

C. Horizontal and Vertical Alignment

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 roadway and how it fits into the landscape - its alignment and geometry - should be preserved to the maximum extent practical.

Context Sensitive Solutions for Work on Scenic Byways, MDSHA, 2004, page 9

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 match the cross section of the existing road sections in order not to create false driver expectations about safe travel speeds.

When curvature sharper than the AASHTO recommended values is used, a post-construction test should be conducted, and the road posted accordingly. Refer to the Design Manual for the horizontal and vertical design requirements for the specific design speed.

D. Roadway and Right-of-Way Widths

New Roads

For new subdivision 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.

In the rural area, new subdivision roads should have road and right-of-way widths in accordance with the detail in **Exhibit B** for minor rural streets. The addition of acceleration/deceleration lanes and bypass lanes should be avoided on rural roads and especially on roads designated as scenic or within a historic district or rural legacy area 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. In addition, where a new street intersects an existing street without curb and gutter, and the traffic volume is 5,000 or more vehicles per day, an acceleration/deceleration lane is required. Also the need for a bypass lane/shoulder adjacent to the lane across from the intersection street should be evaluated.

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 macadam paving.

The addition of acceleration/deceleration lanes and bypass lanes should be avoided on rural roads and especially on roads designated as scenic or within a historic district or rural legacy area, except where a new street intersects an existing street without curb and gutter, and the traffic volume is 5,000 or more vehicles per day. 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.

County easement agreements should not have a right-of-way requirement in excess of 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.

E. Driveways and Access Points

Requirements for driveway and panhandle widths should also be evaluated in an effort 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. Entrances that are cut into banks should preserve the original frontage of the roadway to the maximum extent possible, while maintaining AASHTO sight distance requirements.

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.

F. Lighting

Exterior illumination within the rural area of the county should be minimized to avoid aesthetic and environmental impacts. While intended to improve safety by improving visibility, lighting fixtures can also contribute to accidents as they are stationary objects near the travel way.

Where necessary, 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.

G. 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.

Barriers should be constructed with appropriate systems (approved by NCHRP Report 350) and compatible with the scenic nature of the roadway. Possible barriers include:

STANDARD

- Galvanized
- Polyester Coated
- Weathering Steel

SPECIALIZED

- Ironwood Aesthetic Guardrail (TL-3)
- SHA Approved Cable Barrier System
- Steel-Backed Timber Guardrail (TL-3)
- Stone Masonry Guardwall (TL-3)
- Precast Concrete Guardwall (TL-3)

H. 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 so as to preserve or enhance the character of the scenic or historic 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 of COMAR 20.50.02.02A.

The public utility easement (PUE) should be located where it 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.

I. Landscaping and Plant Materials

Natural landscape features, particularly native and traditional plant materials and tree cover, should be preserved and enhanced. Natural vegetation should be allowed to become established as close to the shoulder edge as possible, with consideration of clear zones and trees. Where appropriate, the use of native plant materials in natural planting patterns and historically traditional plant materials should be emphasized to enhance the character of the roadway.

Where applicable, plantings of roadside grasses or native ground covers should be used to address erosion problems on shallow slopes. Erosion problems on steeper slopes should be addressed, where applicable, by the planting of vines, ground cover, or other lower-growing herbaceous or woody plants. Ground cover decreases runoff and uptakes harmful substances, which might otherwise make their way into the water.

Where public safety or future maintenance concerns are not at issue, removal of existing healthy trees should be avoided. In particular, specimen trees and other interesting landscape features within the right-of-way should remain undisturbed to the extent possible.

J. Bicycle Accommodations

Baltimore County rural roads are an important recreational resource. Biking has become more popular than ever especially with speed cyclists who need a long-distance network.

Bicycle use in the rural areas should be encouraged and protected as it provides an excellent way to enjoy the fruits of the county's land preservation efforts. All motorists need to recognize that bicycles are a legitimate roadway vehicle and understand how to properly share the road with cyclists.

III. BRIDGES AND CULVERTS ON RURAL ROADS

A. General

Any improvements of bridges on rural roadways should be done in such a way as to preserve/enhance the character-defining features of the existing roadway. The goal is for the bridge to appear as a consistent and continuous extension of the approach roadways. For this reason county policy encourages the rehabilitation of an existing bridge rather than the building of a new structure.

For the purposes of this document, a bridge is any structure with a length from face of abutment to face of abutment of 20 feet or greater. This is also the threshold for qualifying a structure for federal bridge funds. Structures with a length of less than 20 feet are defined as culverts.

B. Bridge and Culvert Rehabilitation

Bridge and culvert rehabilitation should attempt to maintain/replicate the appearance of those features of the existing bridge/culvert that are visible from the roadway to the extent feasible. The County will repair when a structure can reasonably be repaired and replace to a minimum width when replacement cannot be reasonably avoided.

Railings and other visible features that have deteriorated should be rebuilt or replaced with elements of the same appearance. Where elements need to be strengthened to meet modern requirements the strengthened members should be designed to resemble the original elements as closely as possible. If concern about a hazard adjacent to the bridge indicates a possible need for transition guardrail, the first choice should be to extend the rebuilt existing railing/parapet and flare it away from the bridge to serve in lieu of guardrail. If transition guardrail cannot be avoided, the connection with the rehabilitated railing/parapet should be as simple and unobtrusive as possible. Road widening will be no longer than necessary to provide smooth and safe transition back to existing road width.

Aging pipe culverts that need rehabilitation should be replaced with similar structures rather than more significant and larger/wider bridges if practical and allowed by permitting agencies. A waiver should be sought from the State if they require a bridge to replace a culvert.

C. Bridge and Culvert Replacement

1. Alignment and Profile

The design speed and character of the horizontal alignment and profile of the replacement structure should be consistent with the design speed and character of the existing roadway on either side of the bridge. The bridge/culvert alignment should be set to appear continuous with the approach roadways.

2. Bridge/Culvert Width and Driving Surface Width

Bridge/culvert width from face to face of railings/parapets should be based on the width of the existing approach pavement plus a three foot refuge area on either side subject to the minimums available under state and federal guidelines and as shown in the chart below.

<i>ADT</i>	<i>Minimum Width*</i>
Less than 400	22 (2-9-9-2)**
400-1500	26 (3-10-10-3)
1500-2000	28 (3-11-11-3)
Greater than 2000	30 (3-12-12-3)

*Additional width may be required depending on environmental or geometric constraints.

**If existing roadway is 1000' each direction and less than 15' wide AND existing bridge is less than 15' wide- replace with single lane bridge approximately 2' wider than the approach roadway width but not less than 13' wide.

Waivers from SHA will be requested as appropriate to achieve widths of 26 feet or less unless existing road width is 26 feet or greater.

The driving surface should appear to continue across the bridge at the same width as the approaching roadways. The driving surface should be delineated separately from the refuge areas by making the pavement of the refuge areas a different color and/or texture or, where conditions permit, by continuing reinforced turf shoulders across the bridge.

There are several techniques that should be investigated for achieving a differential color and texture for the refuge areas. They include stamped and colored concrete, formed grooved concrete, rumble strips, rolled aggregate and saw cut grooved asphalt or concrete. Reinforced turf shoulders can be continued across the bridge on precast concrete arches and similar structures where the depth of earth fill above the top of the structural slab is sufficient to support turf growth, usually about 24 inches, and where the top of the structural slab can be adequately waterproofed and drained to prevent salt buildup on the slab surface.

3. Spans

Bridge spans are established by the needs of the under-crossing stream or other feature and are not addressed by these guidelines. The use of open bottom culverts to allow for continuation of natural streambeds through the culvert is an environmental matter and is also not addressed by these standards.

4. Railings, Parapets and Approach Guardrail

Railings and parapets should be consistent in appearance with other bridges along the same road and/or with the previous bridge on the site. In general, the goal is to keep the railings simple and with a minimum number of different elements, so that the bridge does not call attention to itself and so that the railing is easily maintained.

Railings and parapets must be of a crash tested design approved by FHWA for use.

5. Details and Finishes

Details and finishes should preserve/enhance the character defining features of the existing roadways on either side and of the surrounding locale. In many cases the existing bridge parapets are of concrete, which has weathered to a dark tan color with a rough texture. New concrete should be made to approximate this color and texture through application of stains and sandblasting. Colors on railings and other features should be kept to neutral earth tones with the goal of having the element blend into the natural background in all seasons.

D. Pipe Culverts

Smaller culverts are often constructed of round or elliptical pipe. Such structures can usually be constructed to avoid the use of guardrail altogether. Wherever environmental conditions and

stream alignment permit, culverts should be extended so that their ends are outside of the clear zone. In most cases this will remove the need for guardrail. The driving surface should appear to continue across the bridge at the same width as the approaching roadways.

The culvert should be ended simply with a flared end section set even with the approach slopes. This will remove the need for headwalls. The area between the edge of pavement and the end of the culvert should be planted to match the side areas of the approach road.

IV. Traffic Calming

The term *traffic calming* refers to measures intended to reduce the undesirable effects of traffic. Such effects are generally two-fold: inappropriate (generally too high) speeds for a route or street, and inappropriate traffic (e.g., through traffic on a residential street). It is important for designers and the community to fully understand the traffic problems that might be addressed by a traffic-calming solution. The context sensitive design standards presented in this document are in themselves a means of traffic calming. On local, rural roads, limited sight lines, narrow bridges, and narrow driving lanes are desired for their cautionary influence on drivers as well as their contributions to rural character.

Traffic calming challenges the traditional design view of a roadway design, namely that higher speeds are desirable and indicative of a high-quality design. While this may be true for higher-classification facilities, it may not be viewed as true by those who live along the highway or on residential or local streets. Designers should learn to adapt to the request by the public to provide a safe, lower-speed street that meets functional requirements.

A Guide for Achieving Flexibility in Highway Design, AASHTO, May 2004, page 88

Many traffic calming programs are developed around the three “E’s” – education, enforcement, and engineering. These same three components can be used to address the problems associated with the rural road system in Baltimore County, namely excessive vehicular speeds and traffic searching for “shortcuts” off of the more appropriate arterial roadways which have increasing congestion.

Education – This component alerts people to ways they can ease traffic problems. Examples include: speed radar display boards and community outreach.

Enforcement – Utilizing Baltimore County Police and Maryland State Police, along with appropriate technological options, to enforce the traffic laws especially in high speed areas and in areas where vehicles exceed weight or size restrictions.

Engineering – Traditional traffic calming efforts in neighborhood areas call for the engineering of active devices, such as speed humps, chicanes, etc. to slow and moderate vehicular traffic flow. On rural roadways outside of the neighborhood area traffic calming can be incorporated in a more passive methodology by allowing existing vertical and horizontal alignments to be maintained, and by utilizing the narrower roadway widths, which were outlined in Chapter III. Some active traffic calming methods may be appropriate on the rural road network. These methods include: traffic circles, single-lane roundabouts, multi-way stop signs in lieu of new traffic signals, and rumble strips.

V. CONCLUSION

These standards were developed in response to input from property owners and communities in rural Baltimore County and are in keeping with the provisions in the Baltimore County Master Plan 2010.

Public opinion and the context-sensitive design movement have come together to suggest that Baltimore County should embrace new standards for rural roads. The key principles should be to minimize width changes, to minimize design speeds and to create consistent driver expectations which are compatible with rural preservation. Rural road standards that allow roads to maintain their rural characteristics support the county's commitment to managed growth and land preservation and provide for safe use of the public roadways by a variety of users.

Appendices

Exhibit A -- Abbreviations

The abbreviations listed in the General Provisions, Section 1, item 1.04, of the Maryland Department of Transportation (MDOT) State Highway Administration (MSHA) *Standard Specifications for Construction and Materials* (latest edition) are adopted. In addition, the following abbreviations shall have the meanings indicated here:

AASHTO - American Association of State Highway and Transportation Officials

ADA - Americans with Disabilities Act

ADT - Average Daily Traffic

FHWA - Federal Highway Administration

MDOT - Maryland Department of Transportation

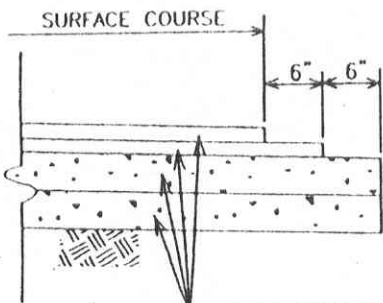
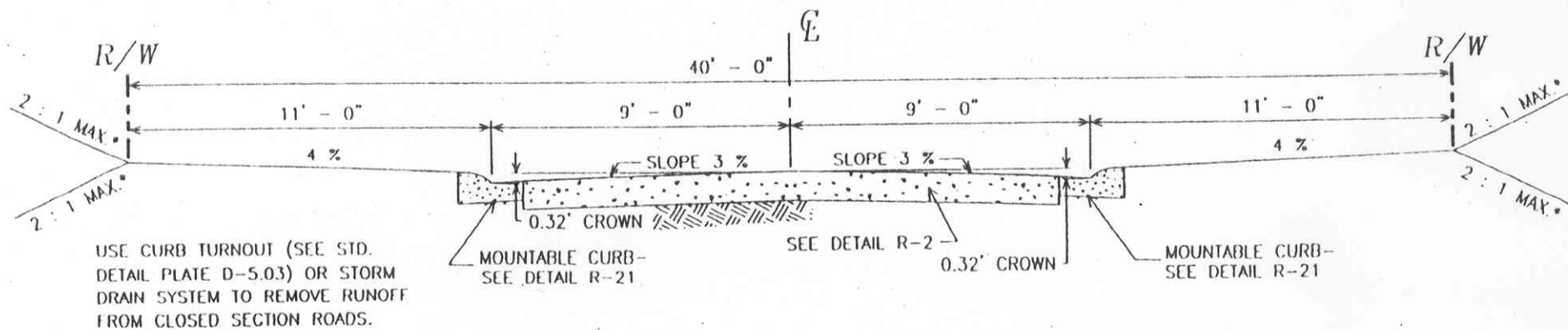
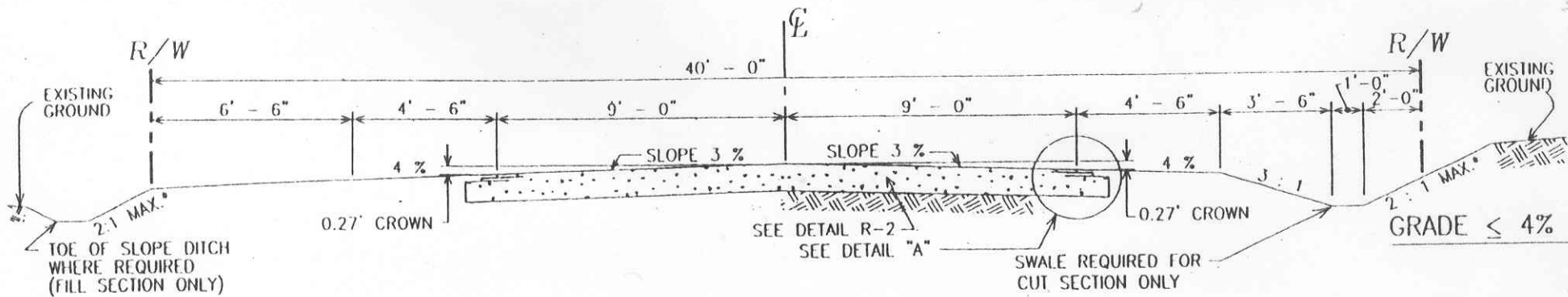
M-NCPPC - Maryland National Capital Park and Planning Commission

MSHA - Maryland State Highway Administration

MUTCD - *Manual on Uniform Traffic Control Devices*

NCHRP - National Cooperative Highway Research Program

Exhibit B. Road Standard Detail



DETAIL "A"

FOR PAVING SECTION, SEE DETAIL R-2

DRAFT

NOTES

1. THIS DETAIL SHALL BE USED ONLY IN RC ZONES FOR ROADS WITH AN ADT OF 2000 OR LESS.
2. STABILIZATION OF SLOPES & GRADES SHALL BE IN ACCORDANCE WITH THE PLANS OR AS DIRECTED BY THE ENGINEER.

* CUT & FILL SLOPE GRADES SHALL BE IN ACCORDANCE WITH RECOMMENDATIONS OF A REGISTERED GEOTECHNICAL ENGINEER.



APPROVAL

DIRECTOR

BUR. OF ENGINEERING/CONSTRUCTION

DATE

DEPARTMENT OF PUBLIC WORKS
STORM DRAINAGE DETAILS
MINOR RURAL STREET

LOTS ≥ 1 ACRE & FRONTAGE ≥ 150 FEET

ISSUED: _____

REVISED: _____

REVISED: _____

PLATE

RURAL 1