Chapter 14 - Subdivisions

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Chapter 14 - Subdivisions

14.1 Introduction

14.1.1 Objective

This chapter is devoted primarily to the design criteria and technical aspects of the design of drainage facilities for subdivision streets and roads that are designated to become a part of the State Secondary System of Highways.

It should be recognized that subdivision land drainage is the responsibility of the local government in whose jurisdiction the land lies. The policies, criteria, and design recommendations contained herein apply only to the streets and roads that are or will be maintained by VDOT. Once the streets and roads have been accepted into the System for maintenance they should be considered as another property within the watershed and the Department should be considered another property owner when assigning responsibility for drainage or drainage improvements within a watershed.

For more comprehensive information concerning administrative requirements for subdivisions, refer to the current editions of VDOT Subdivision Street Requirements and the Guide for Additions, Abandonments, and Discontinuance – Secondary System of State Highways. Both publications are produced by the VDOT Maintenance* Division in Richmond and can be obtained on VDOT's web site http://www.virginiadot.org*.

For the purpose of administering the State Transportation's Board's policy concerning subdivisions, a subdivision is defined as "the division of lot, tract, or parcel into two or more lots, plats, sites, or other division of land for the purpose, whether immediate or future, of sale or of building development."

Any re-subdivision of a tract or parcel of land is interpreted as a new subdivision under this definition and must satisfy all VDOT requirements for street additions to the Secondary System irrespective of the date of the original subdivision.

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14.2 Policy

14.2.1 Applicability

These requirements are applicable to all subdivision streets which are designated to become a part of the State Secondary System of highways. Department engineers are allowed to exercise discretionary judgment for the practical application, in peculiar individual situations, that will allow the optimum development of land without sacrificing the integrity of the policy.

The Department's review and approval is applicable only to streets that are proposed to ultimately be added to the State Secondary System.

14.2.2 Agency Permits and Coordination

Plats and/or plans of all proposed subdivisions within a Residency's geographical boundary, whose streets are intended to be added to the Secondary System, should be submitted to the appropriate Resident Engineer for his review. In counties which have administrative staffs who administer the county ordinance, these submissions should be made through the country staff instead of directly to the Department's Resident Engineer. The plats and/or plans should include:

- The complete drainage layout including all pipe sizes, types, drainage easements, and means of transporting the drainage to a natural watercourse (For a definition, in a legal sense, of a natural watercourse, see Chapter 4). Not only should we consider the present drainage of the immediate development, but the evaluations relative to future expansion or new adjacent development should be made as to their effect on the facilities proposed for the immediate development. Care must be taken to assure that sufficient easements are provided to a natural watercourse or to furnish an acceptable agreement from county authorities to save the Department harmless from future claims
  A typical cross section showing the proposed street construction, width, depth, type of base, type of surface, etc.
- A profile or contour map showing the proposed grades for the streets and drainage facilities
- A location map indicating the tie-in with the existing VDOT road system
- CBR tests for the Department's review of pavement design

It is not intended that VDOT do the design work for the developer. Therefore, all computations utilized in determining the drainage facilities (including design calculations along with bridge plans that may be part of the subdivision) should be submitted for review. The Department's engineers will check computations that are pertinent, but the original design work should be done by the developer's representatives who are licensed by law to do such work.

Upon receipt of the plats and/or plans, the Resident Engineer is to study the layout thoroughly and determine if it is in compliance with all requirements of the Department, noting thereon any changes he feels should be made and:

- The drainage features may be referred to the district drainage engineer for review. Should there be a subdivision on which the district feels it should obtain further advice, the matter should be referred to the Hydraulics Section of the Location and Design Division
- Where a situation other than drainage appears to be complicated, and if the Resident Engineer has any doubt regarding it, he is to forward the prints and all data to the District Engineer for advice. Likewise, the District Engineer should consult further with the Maintenance* Division and the Location and Design Division on any matter which he feels is necessary. After appropriate corrections or changes have been noted on the plats and /or plans by those making the review, they should be returned to the Resident Engineer for his further processing
- The Resident Engineer will return to the developer, or where applicable to the county official, the plats and/or plans approved subject to notations thereon, keeping one copy for his files. He should list the required changes in his letter of transmittal. In counties where the plats and/or plan are not signed by the Resident Engineer, the board of supervisors of the county should be notified that the subdivision prints have been reviewed, certain recommendations made, and, if the subdivision is developed according to plans, that the streets will be eligible for State maintenance funding.
- Plan approval by the Resident Engineer signifies his recommendation for VDOT approval of that which was shown on the plats and/or plans at the time of submittal and includes revisions noted thereon by him. Any other revisions thereto, additions, or deletions require detailed written approval of each change.

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14.3 Design Criteria

Where the local subdivision control ordinance requirements exceed VDOT requirements, the local ordinance should become the VDOT policy and govern when VDOT acts as an agent of the local governing body by the review and acceptance of subdivision streets. Drainage facilities, including off-site facilities when necessary to provide adequate drainage, must meet the minimum requirements for Maintenance, adequately pass the 10-year frequency runoff and comply with the following:

14.3.1 Hydrology

Peak discharge should be determined by methods appropriate for the size, location, and character of the watersheds involved. Where floodplain reports have been prepared for the area, they should be considered in the design. If these floodplains are affected by tides, tidal action reports should be included. Appropriate design storm frequencies should be utilized depending upon the risk of damage to both adjacent property and the roadway. Minimum design criteria applicable to the roadway may not be acceptable relative to the adjacent property damage potential, thus requiring higher design criteria.

Refer to Chapter 6 for more specific information relative to hydrology.

14.3.2 Hydraulic Design

No exact criteria for flood frequency or allowable headwater/ backwater values can be set which will apply generally to various locations. In the hydraulic design of drainage structures, the following risk evaluations should be considered.

- Damage to adjacent property
- Damage to the roadway and/or structure
- Traffic interruption
- Hazard to human life
- Damage to stream and floodplain environment
- Emergency access

Hydraulic design and analysis techniques should be appropriate for the type of structure or system of structures involved and may require flood profiles and water surface profile analyses. In areas involving floodplains, the Federal Flood Insurance requirements, relative to zoning and hydraulic design to accommodate the 100-year flood, should be fully considered.

The hydraulic design of drainage facilities for subdivisions should comply with or exceed the minimum requirements for Maintenance as noted in other chapters in this manual and shall, in addition to the above, be designed to adequately pass the 10-year frequency runoff without interruption to traffic.

14.3.2.1 Culvert Hydraulics

The minimum design for culverts in a subdivision will accommodate the 10-year flood frequency runoff where the primary concern is the maintenance of traffic and convenience to the highway user.

For other culvert design considerations and a design procedure for the selection of highway culverts for use in subdivisions, refer to Chapter 8*, Culverts.

14.3.2.2 Storm Drain Hydraulics

Storm drains in subdivisions will be designed to accommodate the runoff from a 10-year frequency storm. Exceptions to this will be based on local conditions where potential damage to contiguous property is excessive or Federal or State regulations dictate the employment of a design storm of less frequency (greater intensity).

For other information concerning the design of storm drains and for design aids, see Chapter 9, Storm Drains.

14.3.3 Channels

Where open channels are used in lieu of closed storm drain systems, the minimum requirements should provide for a 10-year recurrence interval runoff without exceeding the banks of the channel. The dispersion of water from the termination of artificially constructed channels should be accomplished in such a manner as to avoid damage to adjacent properties. Where the combination of soil conditions and velocities will result in erosion, channel linings should be provided to prevent erosion. Where standard roadside ditches have insufficient capacity for the 10-year runoff, a storm drain system should be provided. Open channels may be considered if their construction can be accomplished without creating a hazard or condition detrimental to the appearance of the subdivision.

Additionally, the design of channels in subdivisions must adequately consider the protection of adjacent property, the roadway, the environment, and floodplains during floods of greater magnitude than the 10-year design storm, in accordance with Chapter 7, Ditches and Channels.

14.3.4 Structural Design of Culverts, Storm Drains, and Bridges

Pipes for culverts and storm drains shall comply with the current Drainage Design Memoranda (DDM), the current VDOT Road and Bridge Specifications, and the current

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Road Designs Manual and the current Road and Bridge* Standards, to the extent that they are respectively applicable to secondary roads and subdivision streets.

Bridges and box culverts shall be in accordance with the current bridge design specifications established by AASHTO. Calculations utilized in the design should be submitted with each bridge plan in order to expedite Department review.

14.3.5 Dams

Whenever dams are to be utilized as roadways, they shall be considered roadway dams and an alternate way of ingress and egress, which is open to the public, must be provided. Plans for dams which are designated for such use shall be reviewed and approved by the Hydraulics Section of the Department's Location and Design Division prior to construction. A formal agreement must be executed between the developer and the Department regarding the relative responsibility of the maintenance of various elements of the dam prior to the Department's acceptance of the roadway on the dam for maintenance. The agreement must absolve the Department of any responsibility for the maintenance of the dam and its control devices and for any damages claimed due to the existence or failure of the dam or its control devices. A sample agreement is found in "Guide for Additions, Abandonments, and Discontinuances – Secondary System of State Highways, by the VDOT Maintenance* Division.

Subdivision streets which cross a dam may be eligible for acceptance into the secondary system of state highways subject to the criteria listed in the Subdivision Street Requirements manual by the VDOT Maintenance* Division. This manual defines dams as an embankment or structure intended or used to impound, retain, or store water, either as a permanent pond or as a temporary storage facility.

Dams shall comply with the applicable General Instructions and Criteria established in 4 VAC 50-20-10 and with the current applicable regulations of the State. Virginia Law, Dam Safety Act, Article 2, Chapter 6, Title 10.1, requires that dams be certified by the State Department of Conservation and Recreation (DCR), according to the information posted on their web site at http://www.dcr.virginia.gov .*

A related situation is roadway embankments that cross impoundment areas upstream of the actual dam. The roadway embankment of these types of crossings typically functions as a causeway and exerts no influence over the function or control of the impoundment area. Increasingly, the Department is being requested to accept these causeway crossings into its maintained secondary system of roadways. In evaluating such request, the Department must consider future maintenance and liability issues regarding long term exposure of the embankment material to saturation and the inspection/repair/replacement of a drainage structure partially or fully inundated by a

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permanent water pool. In order to address these concerns, the guidelines included in Appendix 14 D-1 have been developed for use in the design of these "causeway" crossings and in evaluating their acceptability for inclusion into the VDOT maintained roadway system.*

For additional information, see the DCR web site for Dam Safety Programs at http://www.dcr.virginia.gov .*

14.3.6 Drainage Easements

Drainage easements should be provided from all drainage outfalls to extend to a natural watercourse, defined in Chapter 8,* Ditches and Channels, or furnishes an acceptable agreement from county authorities to save the Department harmless from future claims.

In some counties, stormwater detention is required by County ordinances. This is recognized by VDOT as a viable stormwater management practice. However, stormwater detention, per se, is not an acceptable alternative to providing a drainage easement and outfall down to a natural watercourse, unless through agreement, the County assumes responsibility for maintenance of the detention facilities and the outfall and agrees to hold the Department harmless in case of damages claimed due to the existence or failure of the detention facilities or the outfall.

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14.4 Design Procedures

14.4.1 Design Documentation

All design data and design considerations, including survey, hydraulic computations, floodplain studies, watershed and land use zones delineation, and other pertinent design data should be properly recorded.

The design documentation assembly should be submitted to the Department along with the subdivision plats and/or plans in order to facilitate the expeditious review of the plans and to minimize the turn-around time of the review process.

Some of the major items that should be addressed are as follows:*

A. Perform a spot check of drainage calculations for:

    1. Proper/applicable design methods and procedures

    2. Completeness and accuracy

    3. Change in flow patterns and diversions

B. Review the drainage that would have a direct effect on the roadway.

    1. Check for adequate pavement drainage and proper placement of drainage structures

    2. Check the location and method by which pavement drainage is conveyed from the travelway. Ensure that drainage off of roadway does not flow into building sites/pads

    3. Review future driveway locations and driveway pipe sizes.

C. Review drainage structures.

    1. Check existing structures (storm sewers, ditches, etc.) for adequacy to convey the runoff that will come to them in conformance with applicable criteria/requirements

    2. Check hydraulic design of proposed drainage facilities with applicable criteria/requirements

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3. Check for proper treatment at ends of drainage facilities (riprap, paved ditches, etcetera)*

4. Check detention facilities for required hydraulic performance, proper outfall, and adequate roadway protection

D. Review erosion control*

1. Check for current and potential erosion and siltation problems

2. Check for impact of the development

3. Check for the adequate placement of erosion control devices

E. Check involvements with regulatory flood plains and/or the 100-year zone

F. Check to ensure that all necessary drainage easements have been designated

A sample subdivision review checklist that can be used in the plan review process is included as Appendix 14 B-1. The checklist is an indication of the pertinent data considered in the design and design review of subdivision plans.

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14.5 References

Guide for Additions, Abandonments, and Discontinuances – Secondary system of State Highways, VDOT Maintenance* Division

Virginia Law, Dam Safety Act, Article 2, Chapter 6, Title 10.1

DCR Dam Safety Req.

2005 Subdivision Street Requirements, VDOT Maintenance Division

SSAR (Secondary Street Acceptance Requirements) Guidance Document

VDOT Land Development Manual Volume I, 1995

VDOT Road Design Manual , Appendix B (1) Subdivision Street Design Guide, Rev March 2009

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