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DATE: March 10, 2006

TO: Engineers and surveyors practicing in Carroll County

FROM: Ronald A. Church, Mgr.

RE: Design of storm drainage systems which convey runoff to a storm water management facility

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The purpose of this memorandum is to state the position and policy of the Carroll County Department of Public Works (DPW) with respect to the design of storm drainage systems which capture and convey runoff to a storm water management facility. Although the information and procedures presented here will apply primarily to the design of drainage systems in or along closed section roads, they shall apply also to the design of drainage systems for open section roads.

The DPW Design Manual presently requires that the Rational Formula (RF) method of determining quantities of runoff be used for design of public storm drainage systems. The Office of Storm Water Management (SWM) requires the use of the SCS TR-55 (TR-55) method for determination of quantities used in designing storm water management facilities. It has been demonstrated that analysis of the same drainage area using both computational methods can yield significantly different results. In order for management facilities to function as intended, it is necessary that the drainage systems conveying runoff to them be designed so that the management facility and drainage system are hydraulically compatible. Since the 10 year frequency event is the basis for design of both storm water management facilities and drainage systems it shall be the design frequency used for this procedure. Unless otherwise noted any quantities referred to shall be understood as being on the 10 year frequency.

Information provided by the Office of Storm Water Management indicates that when drainage areas are within SCS hydrologic soil groups B, C, or D runoff quantities determined using the TR-55 method range on average approximately 50% greater than when determined using the RF method. In instances where the entire drainage area is in group A, quantities determined by both methodologies are approximately equal. Therefore, wherever the drainage area(s) are within groups B, C, and D, a factor of 1.5 applied to RF quantities shall be recognized and accepted as the proper conversion from RF quantities to TR-55 quantities. Where the <u>entire</u> drainage area, or group of drainage areas, contributing to the storm drain system are completely within soil group A, RF quantities shall be considered as being equal to TR-55 quantities.

To convert flows, the following general procedure will be used

1. Starting at the highest inlets, convert RF Q2 to RF Q10. Apply the 1.5 factor to obtain TR-55 Q10.
2. Using TR-55 Q10 calculate inlet capture and note the remainder as flow-by.
3. Repeat the procedure for each subsequent downgrade inlet, adding in the flow-by from upgrade structures.
4. When the lowest pick-up point* is reached, calculate TR-55 Q10 and add in accumulated flow-by from upstream structures.

5. Using standard design methods provide additional inlets as necessary to capture 100% of the TR-55 Q10 runoff.
   IMPORTANT DESIGN NOTE: The provision of additional inlets as noted here is not to be construed as meaning that those inlets must be located at or near the lowest pick-up point. The primary function of a drainage system is to remove water from the road surface. Additional inlets, if they are necessary, should be placed at locations on the road where they will be the most effective in removing runoff from the surface. If this procedure would result in more than two inlet structures on each side of the road, at the lowest pick-up point, those structures should be placed at critical locations farther upgrade.
6. Check the carrying capacity of the pipe from the last pick-up point to the SWM facility. This pipe must be able to convey the total TR-55 Q10 quantity to the facility.

It is acknowledged that use of this design procedure will result in construction of drainage systems which are more efficient than those designed using current minimum acceptable standards of the DPW. Therefore this procedure may be used without prior approval of the DPW. When used, the following note must appear on the first page of the storm drain computation booklet and on the storm drain tabulation sheet in the final construction plans:

Design of the storm drainage system for this project utilizes a 1.5 conversion factor for pick-up and conveyance of 100% of the 10 year runoff to the storm water management facility.

If there are any questions please be in touch at the numbers above or email rchurch@ccg.carr.org . Thank you

* the lowest pick-up point is that point on a road or in a development beyond which any runoff not captured by the drain system will flow offsite possibly impacting an existing public road, drainage facility, off-site properties or other facilities.

Attachment: none
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Storm Water Management (SWM) file
rac file