

## Appendix 11: Critical Storm Method

The Critical Storm Method is a criteria recommended for controlling the peak discharge of stormwater from larger storm events (1 - 100 yr recurrence interval). It is recommended to protect property from flood damage and channel erosion, and to protect water resources from degradation resulting from accelerated stormwater flows.

In Ohio, most peak discharge control regulations reside in the requirements of a municipal, township or county government or in a stormwater . While the state of Ohio recommends the use of the Critical Storm Method for peak discharge control, actual requirements will vary according to what each community has adopted locally in conjunction with Ohio EPA NPDES permit requirements. This method has previously been included in the Ohio Stormwater Control Guidebook (ODNR, 1980), ODNR-DSWR model regulations and standards to prevent stream channel and floodplain erosion (Ohio Revised Code 1501:15-1-05).

### Important Considerations

The use of this or other stormwater management criteria should assume certain conditions for adequate design, construction and continued function of stormwater management practices:

- (1) Stormwater management systems must be designed for the ultimate use of the land. Areas developed for subdivisions must provide a stormwater management system for the ultimate plan of development for all of the subdivided lots.
- (2) Stormwater management facilities and facilities must be designed so that they will continue to function with the least maintenance necessary.
- (3) Stormwater management facilities should be designed to meet multiple objectives as much as possible. For instance pollution control, downstream channel stability, flood control, runoff reduction, and aesthetic quality are sample objectives.
- (4) Stormwater management facilities and facilities shall be designed with specific regard to safety.
- (5) The design criteria shall be applied to each watershed within the development area. All pre- and post-development runoff rates and volumes shall be calculated using their respective drainage divides.

## The Critical Storm Method

A) In order to control pollution of public waters by soil sediment from accelerated stream channel erosion and flood plain erosion caused by accelerated stormwater runoff from development areas, the peak rates of runoff from an area after development may be no greater than the peak rates of runoff from the same area before development for all twenty-four-hour storms from one- to one-hundred-year frequency. Design and development to match the peak rate of runoff for the one, two, five, ten, twenty-five, fifty, and one-hundred year storms may be considered adequate to meet this rule.

(B)

(1) If the volume of runoff from an area after development will be greater than the volume of runoff from the same area before development, it shall be compensated by reducing the peak rate of runoff from the critical storm and all more-frequent storms occurring on the development area to the peak rate of runoff from a one-year frequency, twenty-four-hour storm occurring on the same area under predevelopment conditions. Storms of less-frequent occurrence (longer return periods) than the critical storm up to the one-hundred-year storm shall have peak runoff rates no greater than the peak runoff rates from equivalent size storms under predevelopment conditions.

(2) The critical storm for a specific development area is determined as follows:

(a) Determine the total volume of runoff from a one-year frequency, twenty-four-hour storm, occurring on the development area before and after development.

(b) From the volumes in paragraph (B)(2)(a) of this rule, determine the per cent of increase in volume of runoff due to development and, using this percentage, select the critical storm from this table:

If the percent of increase in runoff volume is		The critical storm for peak rate control will be
equal to or greater than	and less than	
-	10	1 year
10	20	2 year
20	50	5 year
50	100	10 year
100	250	25 year
250	500	50 year
500	-	100 year

Table 1-1 Critical storm determination using percent of increase in runoff volume.

(C) Methods for controlling increases in stormwater runoff peaks and volumes may include but are not limited to:

(1) Retarding flow velocities by increasing friction; for example, grassed road ditches rather than paved street gutters where practical, discharging roof water to vegetated areas, or grass and rock-lined drainage channels.

(2) Grading and use of grade control structure to provide a level of control in flow paths and stream gradients.

(3) Induced infiltration of increased stormwater runoff into the soil where practical; for example, constructing special infiltration areas where soils are suitable, retaining topsoil for all areas to be vegetated, or providing good infiltration areas with proper emergency overflow facilities.

(4) Provisions for detention and retention; for example, permanent ponds and lakes with stormwater basins provided with proper drainage, multiple-use areas for stormwater detention and recreation, wildlife, or transportation, or subsurface storage areas.

**Reference:** Goettemoeller, R.L., D.P. Hanselmann, and J.H. Bassett. 1980. Ohio Stormwater Control Guidebook. Ohio Department of Natural Resources, Division of Soil and Water Districts, Columbus. <http://www.dnr.state.oh.us/soilandwater/water/urbanstormwater/default/tabid/9190/Default.aspx>