

CITY OF CROSSVILLE ENGINEERING DEPARTMENT

Minimum Requirements for Detention, Drainage, & Infrastructure Design

Section I: Definitions

Development – the alteration or modification of a site associated with the redevelopment of property, development of property, change in land use, building additions, paving, grading, drainage improvements, or drainage alterations, etc.

Residential Development (RD) – A residential development is any development of a single recorded residential lot with a single-family house or duplex unit.

Single-Family Residential (SFR) – A residential development of any multiple of lots being developed for residential uses for single-family houses or duplex units.

Commercial Development (CD) – Any development which contains a building or a structure and which is not a residential development or a single-family development.

Other Development (OD) – Any development which does not contain a building or structure and which is not a residential development or a single-family development.

First Flush or Water Quality Volume – The first one-half (1/2) inch fraction of direct runoff from a site produced by a rainfall event.

Site Plan Map – A plan at a scale of 1" = 100' or less that depicts the property boundaries and contours of the ground surface at an interval not to exceed 5 feet.

Section II: General Requirements

All permanent drainage structures including storm sewers, detention basins, detention, controls in lieu of detention, etc., with the exception of driveway culverts limited to 40 feet in length must be sized and designed by a Professional Engineer. If a site requires any of these structures, the site plan, grading plans, SWPPP, or any other required documents must be prepared and sealed by the Professional Engineer.

Any developments that require submission of plans, reports, or documents to be prepared and sealed by a Professional Engineer shall submit calculations for the 2-year, 5-year, and 10-year design storms.

All infrastructure (drainage swales, pipes, inlets, catch basins, cross-drains, under-drains, detention basins, driveway culverts, etc.) and control measures for developments related to onsite and offsite drainage design shall provide adequate capacity to pass the 10-year design storm based on post-development conditions. All discharges from run-on areas shall be included in the design and adequate capacity shall be installed to accommodate these discharges. All structures shall be capable of safely bypassing the 100-year storm event without damage to the structure or the system.

All infrastructure pipes and structures built under streets within the 100-year floodplain shall be adequately sized to pass the 100-year storm event and shall provide 1 foot of freeboard. No structures

or fills shall be constructed within the 100-year floodplain which would create more than 1 foot of backwater. All developments that contain any structures within a 100-year floodplain shall require all documents and design to be prepared and sealed by a Professional Engineer and the hydraulic report shall include the calculations for all areas of the development for the 100-year storm event.

All detention shall be provided on the property for which the detention is required unless waived by the City of Crossville Engineering Department. In the event of a waiver for use of regional detention for the development, an explicit note shall be provided on the design drawings as well as the location of all drainage and access easements.

Any infrastructure within a drainage area that ultimately flows into the right of way of any state route or highway must follow the Tennessee Department of Transportation Drainage Manual.

The presence of a wetland, stream, or drainage problem on a property may require a drainage study by a Professional Engineer. The City of Crossville Engineering Department may request any and all additional studies deemed necessary when a wetland, stream, or drainage problem exists on a property.

Section III: Site Development Overview

There are four types of site development projects for the purposes of determining requirements for a site development permit. The term "site development" also includes any redevelopment of a property (i.e., changing the land use or occupancy use), building additions, paving, regarding, drainage improvements/alterations, etc.

The first objective of permitting discharges associated with development is to improve the water quality by slowing the runoff volumetric flow rate, decreasing runoff, and infiltrating as much as possible into the soil to recharge the groundwater table. Some measures may be used to improve stormwater quality, depending on the nature of the land use and expected pollutants are as follows: bio-retention areas, rain gardens, pervious concrete, and check dams. Sustainable development is encouraged as a method to decrease runoff and improve infiltration.

The secondary objective of permitting discharges associated with development is to improve water quality through the use of treatment techniques applied to the water quality volume. This objective is only applied to commercial developments and other developments.

Requirements vary for each of the four types of site development projects and also based upon the sizes of the development. The following chart is a quick summary of the varying requirements:

Quick Reference: Types of Site Development and Related Requirements					
<i>Type of Site Development:</i>		<i>Applicable Section</i>	<i>Site Development Plan Required?</i>	<i>Point at which Post-construction detention and/or alternate controls is required</i>	<i>Water Quality Volume Treatment Required?</i>
RD	Residential Development	IV	Yes	>5 acres total disturbed area , or > ½ acre impervious area, or > 20% impervious area	No
SFR	Single-Family Residential	V	Yes	>10 acres total disturbed area, or > 1 acre impervious area, or >8 lots	No
CD	Commercial Development	VI	Yes	If post-development flows are 2 cfs or more than pre-development flows	Yes
OD	Other Development	VII	Yes	If post-development flows are 2 cfs or more than pre-development flows	Yes
Notes:					
<ol style="list-style-type: none"> 1. The post-development discharge from all required detention shall not exceed pre-development flows plus 2 cfs. 2. All permanent drainage structures including storm sewers, detention basins, detention, controls in lieu of detention, etc., with the exception of driveway culverts limited to 40 feet in length must be sized and designed by a Professional Engineer. If a site requires any of these structures, the site plan, grading plans, SWPPP, or any other required documents must be prepared and sealed by the Professional Engineer. 					

Section IV: Residential Development (RD)

Residential development is defined as the development of a single recorded residential lot (single-family house or duplex unit). The entire property is assumed to be disturbed until a site plan is submitted to indicate differently. The site plan is not required to be stamped by a Professional Engineer, unless additional information is specifically requested by the City of Crossville Engineering Department due to special or unusual circumstances. Adequate erosion control measures must be used to ensure that no sediment leaves the property.

A stormwater detention basin is not required unless the residential property has more than 5 acres of total disturbed area or the property contains over one-half (1/2) acre of impervious area or has more than 20% impervious area.

Section V: Single-Family Residential (SFR) (includes housing subdivisions)

Single-family residential development is defined as any multiple lots being developed of a residential nature (such as a housing subdivision) for single-family houses or duplex units on each lot.

A single-family residential development with less than 10 acres of total disturbed area, less than 1 acre of impervious area, and less than 8 lots must submit a site development plan on a topographic map. The entire property is assumed to be disturbed until a site plan is submitted to indicate differently. The site plan is not required to be stamped by a Professional Engineer, unless additional information is specifically requested by the City of Crossville Engineering Department due to special or unusual circumstances.

A single-family residential development that has more than 10 acres of total disturbed area, or more than 1 acre of impervious area, or more than 8 lots must submit a site development plan on a topographic map prepared and sealed by a Professional Engineer. A stormwater detention basin will be required unless an alternate plan of controls that provide equivalent or better control than the detention basin is submitted as part of the site development plan. The discharge from the developed site must be no more than 2 cfs above the pre-development discharge. Detention basins are highly discouraged and alternatives are encouraged for single-family residential developments due to the maintenance requirements of detention basins.

Underground detention systems are not permitted for single-family residential developments of any size.

Section VI: Commercial Development (CD) (includes apartments and condominiums)

Commercial development is defined as any development which contains a building or a structure, and which is not a residential development or a single-family development. This includes apartment buildings, condominium buildings, schools, churches, charity organizations, and other land uses which are not usually defined as being "commercial" in nature. In other words, this category also includes industrial, educational, institutional, recreational, and many other land uses.

All commercial developments must submit a site development plan on a topographic map prepared and sealed by a Professional Engineer. A stormwater detention basin or system is required for all sites at which the post-development peak rate of discharge is more than 2 cfs higher than the pre-development discharge. When detention is required, the detention system must limit the discharge from the site to no more than 2 cfs higher than the pre-development discharge.

All commercial developments require the water quality volume from the first flush to be retained and treated. The water quality volume shall be uniformly discharged over a period of not less than 24 hours and not more than 72 hours.

Section VII: Other Development (OD)

Other development is defined as any development which does not contain a building or structure, and which is not a residential development or a single-family development. This type of site development may include such items as parking lots, recreational fields, driveways, entrances, or streets. An OD site development may include right-of-way owned by the city or the state.

All other developments must submit a site development plan on a topographic map prepared and sealed by a Professional Engineer. A stormwater detention basin or system is required for all sites at which the post-development peak rate of discharge is more than 2 cfs higher than the pre-development discharge. When detention is required, the detention system must limit the discharge from the site to no more than 2 cfs higher than the pre-development discharge.

All other developments require the water quality volume from the first flush to be retained and treated. The water quality volume shall be uniformly discharged over a period of not less than 24 hours and not more than 72 hours.