Stormwater Management Design Guidelines for Section 3 Residents

Introduction

These Guidelines will address the requirement for safely controlling stormwater runoff from new impervious surfaces and will assist residents and home improvement contractors during the design and construction process. The goal of Section 3's stormwater runoff ordinance is to make sure improvements on one lot do not have an adverse effect on any neighbors or the public right of way.

Stormwater runoff in suburban areas is the primary contributor to soil erosion, flooding and property destruction. As suburban areas become developed with impervious surfaces, the volume of runoff is greatly increased and must be managed and controlled to limit erosion and flooding. Residential areas with medium density housing are particularly vulnerable to flooding due to the close proximity that detached homes have to one another and the limited open space that serves to allow stormwater to infiltrate into the soil. The goal of these Guidelines are to provide options by which a homeowner can manage and control stormwater runoff generated from new impervious surfaces.

When we speak about impervious surfaces, they include but are not limited to roof lines, driveways, patios, tennis courts, basketball courts, pools.

Stormwater Runoff

Municipal Regulations state (in part) from the Montgomery County Code for Buildings (Chapter 8, Section 8-24, Sec. (a): "… the plans provide for safe conveyance or control of any increased water runoff, resulting from additional impervious area or any other topographic alteration, that would drain onto any adjacent or nearby private property." And from Sec. (c): "Each approved drainage system must be designed to convey or control at least 1.5 inches of rainfall during a 24-hour period."

The most effective method to safely convey and control stormwater runoff for medium density residential projects is to capture the runoff and direct it toward an infiltration device known as a Drywell. A drywell is an underground structure that disposes of unwanted stormwater runoff, by dissipating it into the ground through infiltration, where it merges with the local groundwater. It is a passive structure that passes runoff under the influence of gravity. The captured runoff discharges through a number of small exit openings distributed over a larger surface area along the sides and bottom of the drywell. The internal composition of a drywell contains airspace that can accept an initial inrush of water very quickly, until the air is displaced. After that, the dry well can only accept water as fast as it can dissipate it through infiltration.

There are two general types of drywells:
1. a gravel-filled trench and
2. manufactured modular units

Manufactured modular drywell units are usually constructed with post-consumer recycled plastics and provide up to 95 percent air space capacity (porosity) for stormwater runoff to collect. The modular units are commercially available at home improvement centers and are manufactured in various shapes and sizes. Most of these units also provide a measure of structural support to vertical loading from the ground surface above.

Sample Calculation

The surface area of the proposed patio, in square feet, determines the volume of stormwater runoff that must be safely conveyed or controlled. In the design of a drywell, the required capacity is calculated by uniformly imposing a rainfall amount in inches (1.5 inches per Mont. Co.) on the proposed patio surface area over a specified time (a single 24-hour period). In this manner, mass rainfall (inches) is converted into mass runoff (cubic feet) for the purpose of designing a drywell system capable of capturing the runoff.

Impervious Area = 400 square feet (sf)
Rainfall = 1.5 inches over a 24-hour period

Volume to Capture: 400 sf x (1.5"/ 12" per foot) = 50 cubic feet (cf)

The attached Design Table contains calculated values for runoff volume and compares the volume to four different specific types of drywells. The Table lists the runoff volumes for two ranges of impervious size (less than 200 sf, and 200 sf to 400 sf). For each size range, the four different types of drywells are listed, which will assist in choosing the best type of drywell for a particular set of circumstances.

Four types of Drywells

1. Gravel type – easy to construct and simple to design; these will clog more readily than any other types of drywells and require maintenance and cleaning out every few years.
2. Rain Tank™ Module – easy to design; best option for providing an exact volume; durable and long lasting and resistant to clogging; can be cumbersome to install for large applications.
3. StormTech Chamber™ - easy to design and install; provides largest volume for a single unit; durable and long lasting and will not clog; cannot be reduced in size for small applications.
4. Flo-Well® Vessel – easy to design; durable and long lasting; provides smallest volume of a single unit; cumbersome to install for large applications.

Each of these drywell types are readily available at retail outlets or through internet ordering.

Design Exhibits

Attached to this document are drawings and specification sheets that present design information to assist in the design and installation of drywell systems.

The sample drawing shows a sample design for a proposed 400 sf patio addition. The items depicted in the drawing are shown at a relative scale, which will help the designer visualize the

extent of construction based on the patio size. Note that for each patio addition, a Trench Drain is required to collect the runoff from the lowest point of the patio (all patios are constructed to shed surface water) and direct that runoff towards the buried Drywell system. Trench Drains (and drainage piping) are also readily available at home improvement centers.

DESIGN GUILDLINES FOR DRIVEWAY STORMWATER RUNOFF CONTROL

Drywell System Design Requirements (based on a 1.5" rainfall event)	Proposed Impervious Area (sf = square feet)	
	Less than 200 sf	**200 sf – 400 sf**
Volume to Retain in cubic feet (gallons)	25 (187)	50 (374)
Gravel Drywell[A] (0.40 porosity) Volume of gravel (cubic feet)	62.5	125
Excavation (width, length, depth in feet)	4' x 4' x 5.5'	5' x 5' x 6.5'
Modular Drywell systems, listed below, are commercially available and generally constructed with post-consumer recycled plastics.		
Rain Tank™ Module[B] (0.95 porosity) Volume of module (cubic feet)	26 (3 tanks required)	53 (6 tanks required)
Excavation (width, length, depth in feet)	2.3' x 3.6' x 4.4'	4' x 4.5' x 4.4'
StormTech Chamber™ [C] (0.95 porosity) Volume of module (cubic feet)	26 (1 chamber required)	53 (1 chamber required)
Excavation (width, length, depth in feet)	5' x 7' x 4'	5' x 7' x 4'
Flo-Well® Vessel (0.95 porosity) [D] Volume of module (cubic feet)	26 (4 vessels required)	53 (9 vessels required)
Excavation (width, length, depth in feet)	4' x 4' x 3'	8' x 6.5' x 3'

Notes:

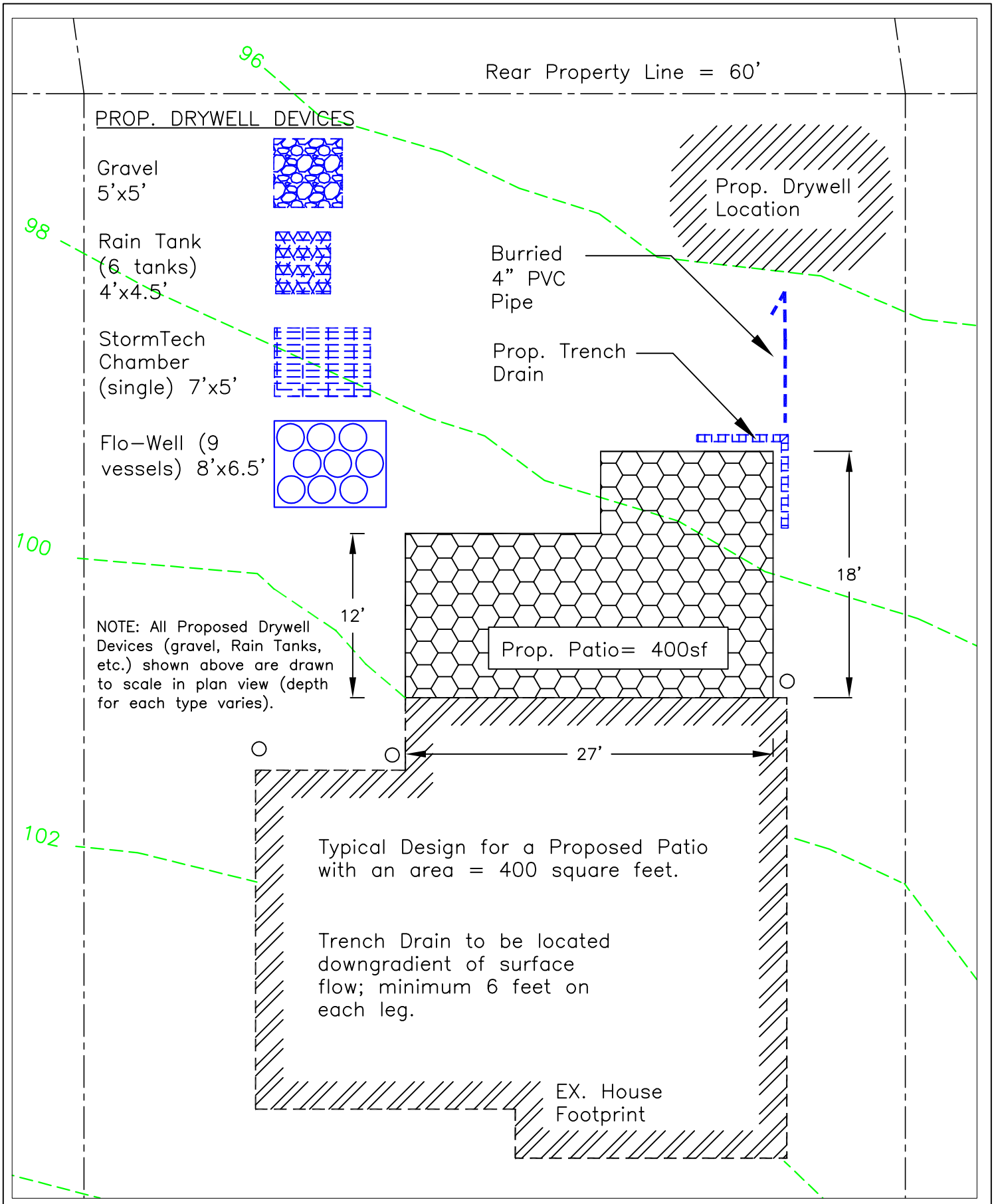
A: Gravel Drywell systems to be constructed in accordance with Montgomery County Guidelines, as seen on 'Drywell For Roof Drain" typical detail, dated March 2007.

B: Rain Tank™ modules are available in single, double and triple sizes. The excavation dimensions shown in the table above are specifically for Rain Tank™ double module units, which have a capcity of 8.7 cubic feet and are available from ACF Environmental (www.acfenvironmental.com).

C: StormTech™ Chambers have a capacity of 46 cubic feet per chamber. A gravel sub-base is required for installation to support the chamber and to augment the capacity with a porosity of 0.4 for the added gravel. Chambers are available at Standard Supplies in Gaithersburg. (www.standardsupplies.com)

D: Flo-Well® vessels have a capacity of 6.4 cubic feet (48 gallons) each. Vessels are available at Standard Supplies in Gaithersburg.

E: All Drywell systems (gravel and manufactured) require a geotextile filter fabric cloth to prevent in situ clogging and PVC piping and fittings for conveyance of runoff from the source to the drywell.



SECTION 3 VILLAGE OF CHEVY CHASE
STORMWATER MANAGEMENT PLAN
TYP. PATIO ADDITION PROJECT
(N.T.S.)