DRAINAGE DETENTION GUIDELINES

1. Subdivisions:

    a. If subdivision is in a drainage district the district's drainage requirements will prevail.
    b. Four or less lots no detention required. Subsequent further re-subdivisions are not exempt from detention requirements (subject to "a" above).
    c. No detention required if drainage goes direct to an "acceptable" outfall (subject to "a" above).
    d. If a subdivision is a "rural" then the rural drainage criteria may be used (subject to "a" above).

2. Non Subdivision Permits:

    a. If development is in a drainage district the district's drainage requirements will prevail.
    b. For developments of 1.05 acre or less and impervious cover increase of 25% or less no detention is required. No detention required if drainage goes to an "acceptable" outfall (subject to "a" above).
    c. For developments of greater than 1.05 acre and 2 acres or less and impervious cover increase of 15% or less no detention is required. No detention is required if drainage goes to an "acceptable" outfall (subject to "a" above).
    d. For developments greater than 2 acres and impervious cover increase of 5% or less no detention is required. No detention is required if drainage goes to an "acceptable" outfall (subject to "a" above).
    e. For individual residences, shops, pole barns, barns, sheds, garages etc. only for personal use of the landowner and not to be used for commercial on site business operations no detention is required (subject to "a" above).
    f. Cumulative Acreage will be used on subsequent permits for the same property ownership/development unless a legal subdivision has occurred (subject to "a" above).

RELEASE OF PERMANENT POWER in C-ZONES

After framing, dry-in, wall sheathing is in place, plumbing and electrical roughed in then permanent power can be released. If onsite detention is required, drainage must be completed before permanent power is released.

DETENTION DESIGN PROCEDURE FOR SMALL DEVELOPMENT SITES IN GALVESTON COUNTY, TEXAS

Design Storm Frequency and Duration

Detention facilities will be designed for a 100-year storm event. The storm durations and rainfall depths to be used in computing runoff volumes are as follows.

DEVELOPMENT AREA VS. DESIGN 100-YEAR RAINFALL DEPTH		
Area To Be Developed (acres)	100-Year Storm Duration (hours)	100-Year Rainfall Depth (inches)
0.00 – 1.50	3	7.27
1.51 – 3.00	6	8.92
3.01 – 5.00	12	10.95
>5.00	24	13.18

Peak Inflow and Outflow Rates

Peak inflow and outflow rates may be estimated using the Site Runoff Curves developed by the Harris County Flood Control District. These curves are included in the Galveston County "Rules, Regulations and Requirements Relating to the Approval and Acceptance of Improvements in Subdivisions or Re-Subdivision" dated October 3, 2005. The peak outflow rate will be set equal to the undeveloped conditions peak discharge from the development site. For drainage areas less than 1.00 acre, the curves may be extrapolated to obtain undeveloped and developed conditions peak flow rates.

Developed Conditions Runoff Volume

The developed conditions runoff volume will be estimated using the following formulas, which are based on rainfall excesses computed using the Curve Number method developed by the Soil Conservation Service. In these equations, VR is the runoff volume in acre-feet, I is the fraction of impervious cover on the site (Percent Impervious / 100), and A is the area of the development in acres.

EQUATIONS FOR COMPUTING RUNOFF VOLUME		
Development Area (acres)	Rainfall Depth (inches)	Runoff Volume (acre-feet)
0.00 – 1.50	7.27	$V_R = [(7.27)(I) + (4.94)(1-I)] \times [A/12]$
1.51 – 3.00	8.92	$V_R = [(8.92)(I) + (6.49)(1-I)] \times [A/12]$
3.01 – 5.00	10.95	$V_R = [(10.95)(I) + (8.43)(1-I)] \times [A/12]$
>5.00	13.18	$V_R = [(13.18)(I) + (10.59)(1-I)] \times [A/12]$

Establishing the Detention Volume Requirement

The detention volume requirement is established using a triangular hydrograph approach. The following equations may be used to compute the detention storage requirement.

$$B = 43560\ V_R/(0.5 \times Q_{IN})$$
$$S = 0.5B(Q_{IN} - Q_{OUT})/43560$$

In these equations, B is the time base of the triangular inflow hydrograph, in seconds. V_R is the total volume of flow into the detention basin in acre-feet (equal to the developed conditions runoff volume from the development), Q_{IN} is the 100-year peak inflow to the detention basin, and Q_{OUT} is the allowable maximum 100-year discharge from the detention basin (equal to the undeveloped conditions 100-year peak flow rate). S is the required storage volume, in acre-feet.

Example Problem

Development Data

- Proposed Development Area = 2.25 acres
- Existing Impervious Cover = 0%
- Proposed Impervious Cover = 50%

Design Data

- Rainfall Duration = 6 hours
- Rainfall Depth = 8.92 inches

Peak Flow Rates (Site Runoff Curves)

- Q_{IN} = 15.4 cfs
- Q_{OUT} = 6.5 cfs

Storage Calculations

- V_R = [(8.92)(0.50) + (6.49)(1-0.50)] x [2.25/12] = 1.44 acre-feet
- B = (43560 x 1.44) / (0.5 x 15.4) = 8,146 seconds
- S = (0.5 x 8,146) (15.4 – 6.5)/43560 = 0.83 acre-feet
- Storage Rate = 0.83 / 2.25 = 0.37 acre-feet per acre

FIGURE 2 Harris County Site Runoff Curves for 100-Year Storm Frequency