**Study Guide Quiz 2**

**(See formula sheet below)**

**Basics of Storm Water Management**

* Understand the changes in philosophy relating to storm water management over the last 10 to 15 years
* Understand how the old approach to design affected both the quantity and quality of storm water runoff
* Know, in general, the problems associated with excessive runoff
* Know, in general, the problems associated with poor quality runoff
* Understand why effective storm water management requires changes both at the site and the regional level.
* Know, in general, the changes needed on a regional level to produce better SWM
* Know, in general, some of the natural processes that are being used at the site level to reduce the quantity of runoff and improve the quality of runoff

**Contour Maps and Water flow**

Know how to delineate the watershed or catchment area from a plan with contours

**SWM – Rational Method**

* Know what the RM is used for and what are its limitations
* Understand the significance of C and i and how they are obtained
* Understand how to calculate a composite C for a watershed with different land cover

**SWM – Modified Rational Method**

* Know the differences between RM and MRM, in particular, what additional information we can obtain from the MRM
* Know why we use Ca in MRM and its significance
* Know what is a hydrograph and how to obtain from it runoff rates and runoff volumes
* Know that a hydrograph is characterize by the duration of the storm
* Understand the differences between Type A, B and C hydrographs and the reason for their different shape
* Know how to construct the different types of hydrograph based on C, Ca, i and A

**SWM – Light Imprint Design**

* Understand why LID is based on the urban transect
* Know the other two common approaches to green SWM and how they differ from LID
* Have a basic understanding of the urban transect (for example, what is difference between T-2 and T-4)
* Know the four categories of tools that are used in LID
* Know the three strategies that are used to reduce the negative impact of paved areas
* Know the difference between detention and retention
* Know what is the basic function of a rain garden

**SWM – Swale and Underground Pipe Design**

* Understand the factors that limit the permissible upper and lower values of velocity in a swale
* Know the physical design features that affect the velocity in a swale
* Understand how and why grass type, height and condition affect the design of a swale
* Know how mowing affect swale performance
* Know the significance of parameters in the Manning’s Equation
* Know the significance of the parameters of the Continuity Equation
* Know the definition of the wetted perimeter in a swale
* Know the significance of retardance
* Know how to calculate the size of an underground pipe for a given volume of water

**Formulas Formula Sheet for Quiz**

**RM**: q = CiA

**MRM**

Type A Hydrograph: qmax = CCaiA

Type B Hydrograph: qmax = CCaiA

Type C Hydrograph: qmax = CCaiA (DUR/Tc)

**Continuity Equation**

q = AV

**Manning’s Equation**

V = (1.485/n) R2/3 S1/2

**Hydraulic Radius**

Cross-section Area/Wetted Perimeter

**Parabolic Swale Equation**

Cross-section Area: A = 2/3 WD

Top width: W2 = W1(D2/D1)0.5

Hydraulic Radius: R = W2D/(1.5W2+4D2)