1. **Contours and Grading**

**(See formula sheet for the exam below)**

**Contours**

* Know and understand the basic characteristics of contours
* Know how to recognize difference landforms from the contour signature
* Understand how to trace the path of water on a contour map
* Understand how to delineate a watershed from contour map
* Know how to create contour map from grid data
* Know how to interpolate for elevations between contour lines
* Know how to determine cross-sections from contour maps

**Site Grading**

* Know how to create contour for road features such as crowns, curbs, sidewalks, swales and side slopes
* Know how to create grading plans for roads and terraces starting with existing contours
* Know how to interpret and extract data from grading plans that have existing and proposed contours

**Cut and Fill**

* Know how to delineate areas of cut and fill from grading plan
* Know the three methods for calculating earthwork volume and the condition under which each is used
* Know how to get extract the data needed to calculate earthwork volumes from grading plans
* Know how to calculate earthwork volume using end area method, contour area method and the burrow pit method as appropriate

1. **Storm Water Management**

**(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

1. **Urbanism and Zoning**

**Overview of Zoning**

* Have a general knowledge of the history of land use zoning in America
* Know the general characteristics of sprawl land use patterns
* Know the derivation and meaning of the term “Euclidean Zoning”
* Know the goals of Conventional or Euclidean Zoning
* Know the main mechanisms used to achieve the goals of Euclidean Zoning
* Know the pros and cons of Euclidean Zoning discussed in the class notes

**Basics of Form Based Codes**

* Know the definition of a Form Based Code
* Understand the main differences between Conventional and FBC
* Understand the reasons why Site Engineers need to know and understand zoning codes
* Know what a Charrette is and its role in FBC
* Know the basics of how a Charrette is organized

**Basics of Form Based Codes**

* Know the five major elements of a FBC and the optional elements
* Know the definition and purpose and form of the Regulating Plan
* Know how the Urban Transect is used in a Regulating Plan
* Know the definition and purpose of the Public Standards
* Know the definition and purpose of the Building Standards

**The Public Realm and Thoroughfares**

* Know and understand the four main goals that guide the design of the public realm and the relationship between the public and private realm
* Know the basic form of the thoroughfare network that is favored in FBC
* Know the list of thoroughfare types included in Miami 21
* Know which of the thoroughfare types are rural and which are urban
* Know the FBC definition for streets, drives, avenues and boulevards
* Understand the differences in design and function between streets, drives, avenues and boulevards
* Know the typical elements of a conventional thoroughfare cross-sections
* Know the typical elements of the sidewalk zone
* Know the why it is important to keep the radius of turn small on walkable thoroughfares

**Formulas Formula Sheet for Finals**

**Cut and Fill**

**End Area Method**

Volume of Fill (or cut) between

Two Cross-sections

= [(A1 + A2)/2] \* L

When A1 or A2 is an end cross-section

Then use

= [(A1+A2)/3] \* L

**Contour Area Method**

V = A1\*h/3 + (A1+A2)\*h/2 + (A2+A3\*h/2 +…. (An-1+An)\*h/2 + An\*h/3

**Borrow Pit Method (Short Cut)**

V = (A/4)\*(1\*h1 + 2\*h2 + 3\*h3 + 4\*h4)

**Storm Water Management**

**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)