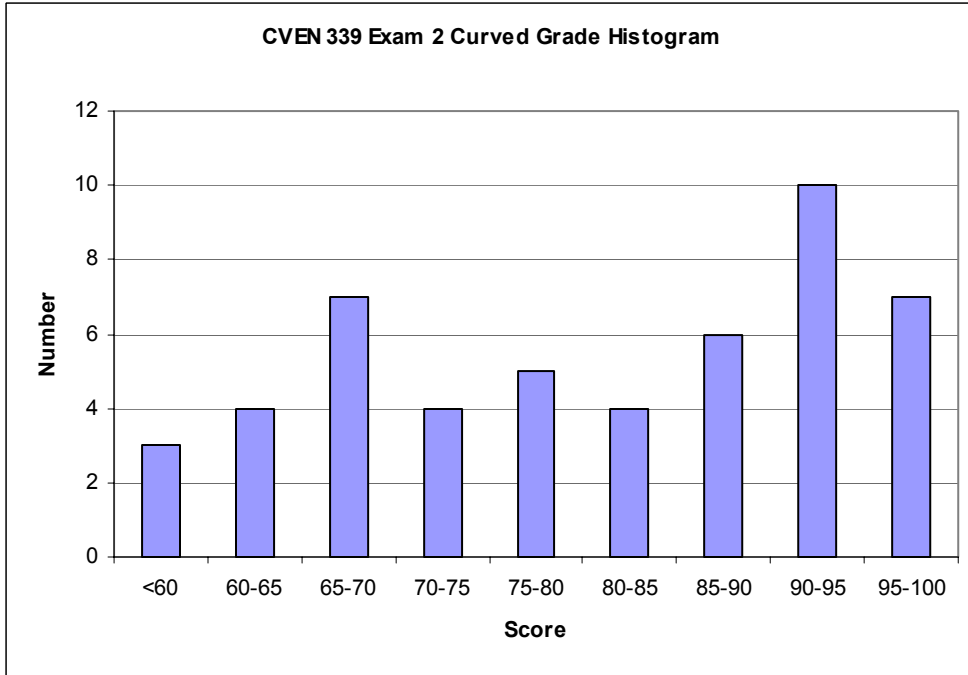


CVEN 339 –Exam #2 – Spring 2004

Grade Statistics

Median        82.6  
Mean         80.7  
Std. Dev.    12.8  
Maximum    100  
Minimum     55.3



Name: \_\_\_\_\_

CVEN 339 – Water Resources Engineering  
Spring Semester 2004  
Dr. Kelly Brumbelow, Texas A&M University

Exam #2

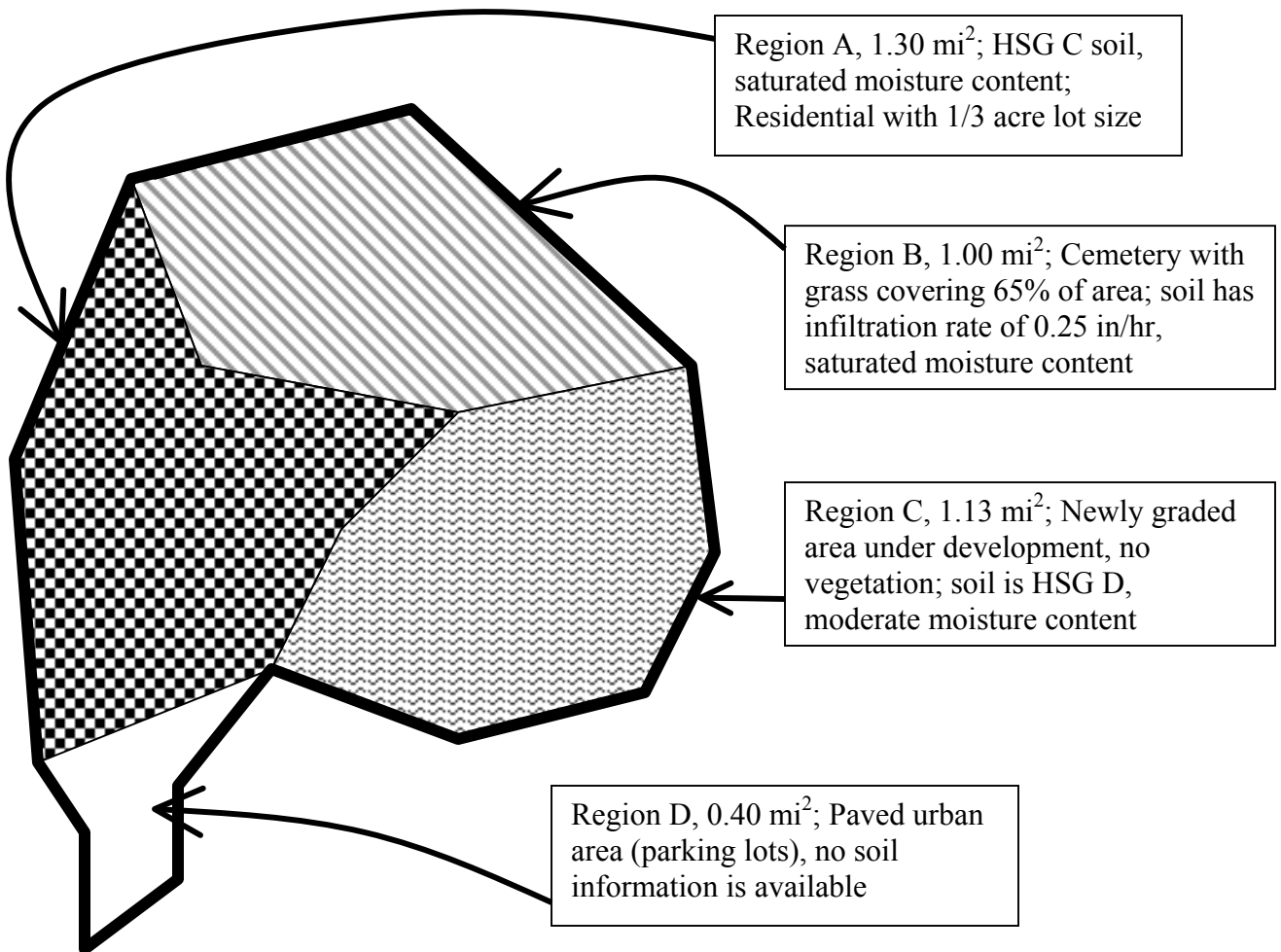
**Open-book, Open-notes (8 pages, 3 questions)**

1. A reservoir is releasing a constant 3,560 cfs outflow. For a given 48 hour period the inflow to the reservoir averages 7,050 cfs. Evaporation from the reservoir can be approximated by the expression:  $E = 0.17S^{0.7}$ , where  $S$  is reservoir storage in acre-feet and units of evaporation are acre-feet per day. If the reservoir storage is 100,775 ac-ft at a given time, *what will be the storage in the reservoir 48 hours later?* (Hint: Since evaporation rate varies with storage, you must average the loss rate over the range of storages experienced. The average-value theorem [i.e.,  $\bar{y} = \frac{1}{x_2 - x_1} \int_{x_1}^{x_2} f(x)dx$ ] is a good way to do this.) (30 points)

2. A watershed is schematically mapped below with soils, land cover, and soil moisture as indicated. Base flow in the watershed is 12 cfs. Also given below is a 30 min-unit hydrograph for this watershed. If a thunderstorm of 0.5 hours duration and 4.75 inches gross rainfall occurs on this watershed:

- What will be the peak outflow rate at the watershed outlet and how long after the beginning of the thunderstorm will it occur? (20 points)
- How long will pass after the beginning of the storm before streamflow at the outlet has receded to 35 cfs? (10 points)

Time (hrs)	30 min-U.H. (cfs/in)	Time (hrs)	30 min-U.H. (cfs/in)
0.0	0	2.5	80
0.5	40	3.0	40
1.0	95	3.5	20
1.5	135	4.0	10
2.0	115	4.5	0



3. Runoff from a parking lot is to be conveyed in an open channel away from the parking lot. A peak runoff flowrate of 27.8 cfs has already been determined for the channel. The channel geometry has already been designed to be as shown below, and longitudinal slope  $S_o$  will be 0.0055. However, a question remains whether the channel should be concrete-lined or grass-lined. If grass is used, it will likely be Bermuda grass kept at 12 inches height (design manuals list  $\tau_{max} = 2.10 \text{ lb/ft}^2$  and  $n = 0.080$  for this type of grass). Determine if either, both, or none of these channel linings is acceptable against the criteria discussed in class. A successful design would meet criteria for Froude number, freeboard, maintenance considerations, and shear stress, at minimum. (40 points)

