CVEN 339 Exam #2 Grades

Section 501:

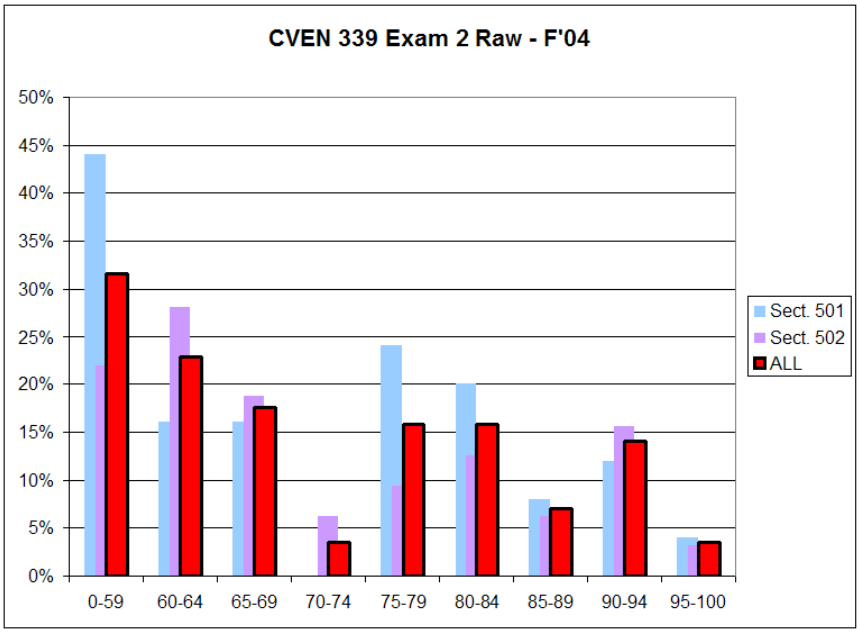
	Raw	Curved
Median	67	74.4
Mean	67.8	75.0
Std. Dev.	17.9	13.7
High	100	100

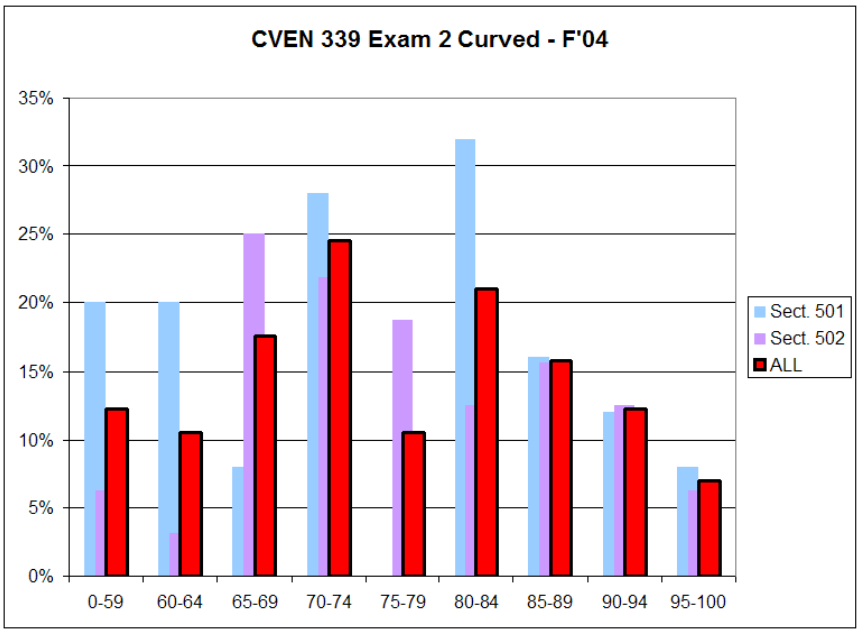
Section 502:

	Raw	Curved
Median	68	75.2
Mean	70.3	76.9
Std. Dev.	14.8	11.3
High	99	99

ALL:

	Raw	Curved
Median	67.5	74.8
Mean	69.1	76.0
Std. Dev.	16.3	12.5
High	100	100





Name: _____

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

Exam #2

Open-book, Open-notes (6 pages, 2 questions)

1. An "Interbasin Transfer" is removal of water from one watershed and relocation to a different watershed by means of some artificial mechanism. These transfers can be made explicitly by pumping stations and pipelines or more implicitly where an entity's water and wastewater systems straddle a divide between watersheds.

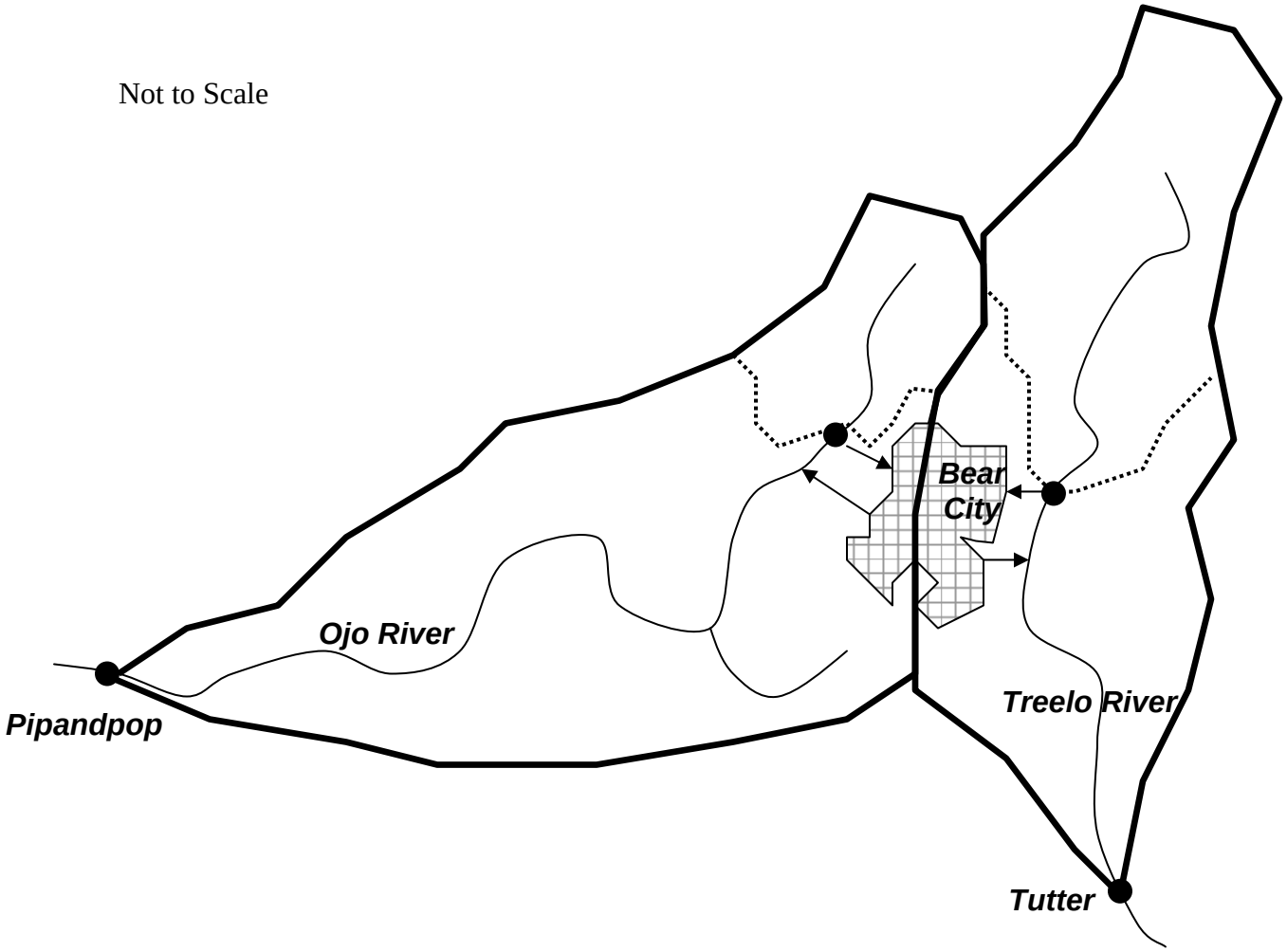
Diagrammed on the next page are two independent watersheds for the Ojo and Treelo Rivers, respectively. Bear City straddles the divide between the two watersheds. It withdraws its municipal water supplies at the points shown in the diagram from both basins and returns its wastewater to both basins. However, because of the population distribution and infrastructure configuration of the city, interbasin transfer of water is possible. Annual precipitation and evapotranspiration are uniform across each watershed but differ between the two watersheds as shown in the table below. The annual water supply need for Bear City is 250,000 acre-feet, and the wastewater return rate is 50% of that amount – for every gallon of water supplied, half a gallon of wastewater is produced and discharged into one or both of the watersheds. There exist no groundwater resources nor surface storage facilities in either basin. Given the additional information tabulated below:

(a) *What is the highest annual streamflow volume that can occur for the Treelo River as measured at Tutter?*
(b) *Under this scenario, what will be the annual streamflow volume for the Ojo River as measured at Pipandpop?*

(55 points)

	Ojo River Basin	Treelo River Basin
Annual Precip. (in)	23	28
Annual ET (in)	9	11
Total Area (mi^2)	600	425
Area above withdrawal point (mi^2)	250	195

Not to Scale



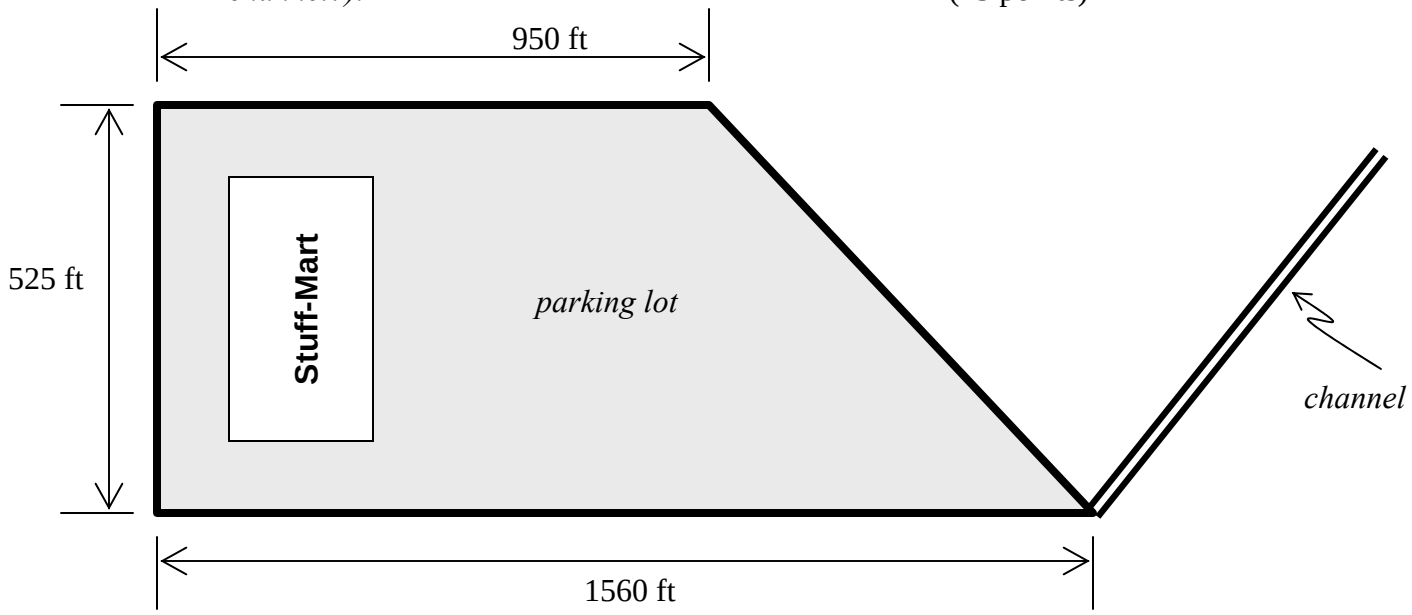
(Work space for #1)

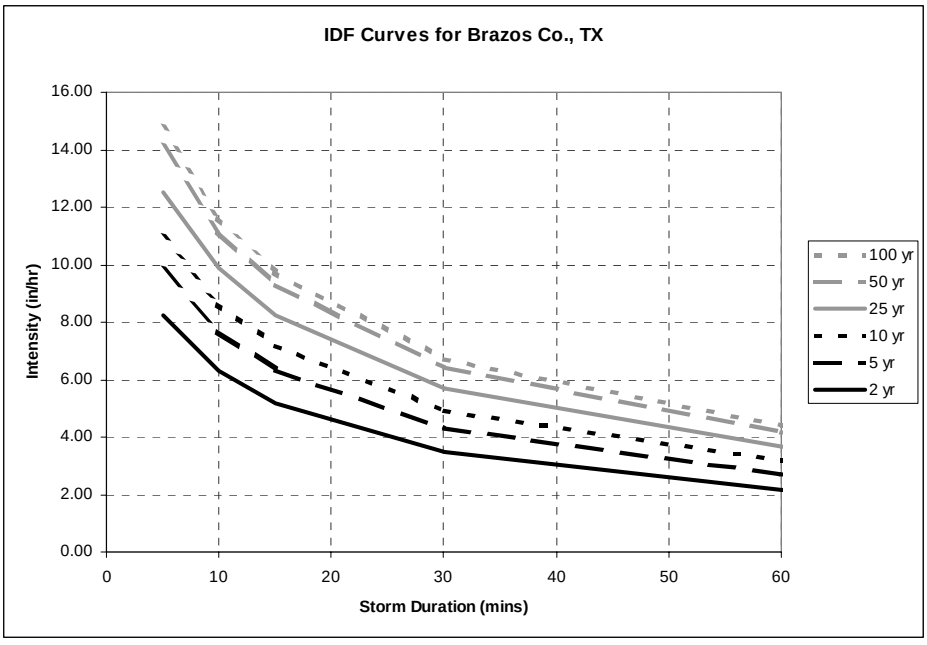
2. Construction of a brand-new Stuff-Mart is being planned as shown in Plan view in the diagram below. All runoff from the parking lot and building roof will flow to the southeast corner and enter the open channel indicated (cross-section on the next page). Design in this location should be for the 25 year storm; the local IDF curves are given below. An easement must be purchased in which to place the drainage channel.

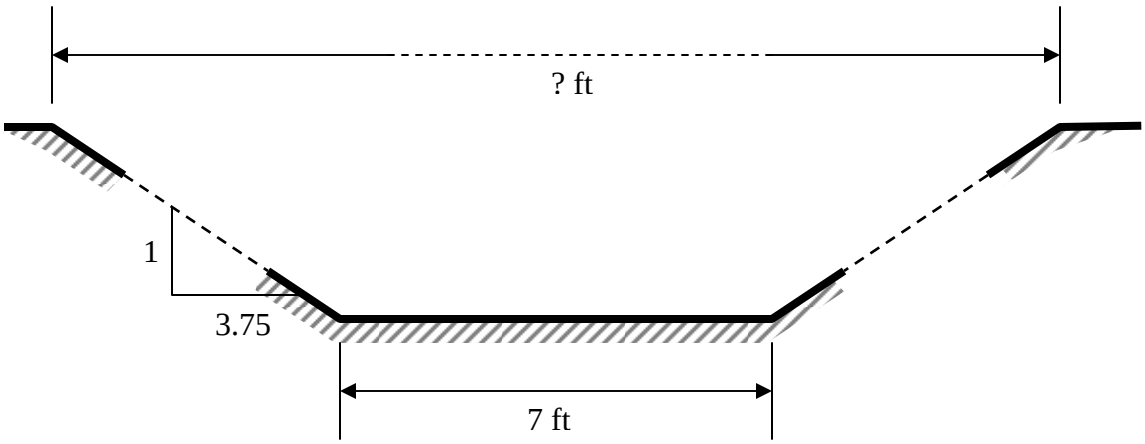
(a) *Determine the flow that the channel must accommodate using the Rational Method.*

(b) *Determine the flow that the channel must accommodate using the NRCS curve number and hydrograph methods.*

(c) *Using the most conservative assumption, determine the minimum width of the easement that must be purchased (i.e., how wide a strip of land is needed for the channel?).* (45 points)







Channel Cross-section

Channel is lined with rough-finished concrete. Bed slope is 0.0086.
Time of concentration for basin draining to channel has been estimated as 8 minutes.
Remember the NRCS assumption that $t_L = 0.6 \cdot t_c$.

(Work space for #2)