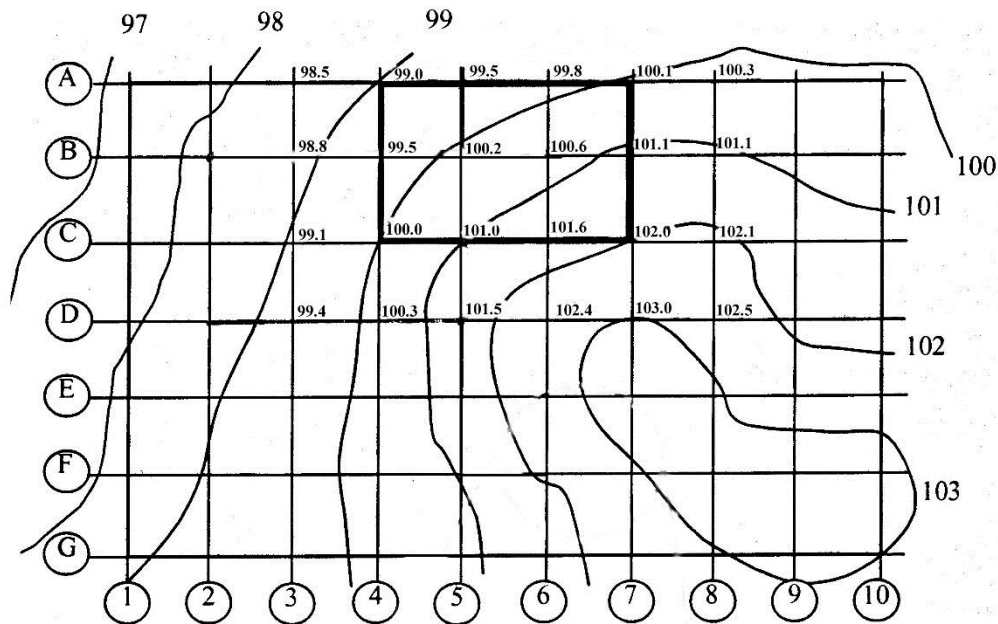

CONSTRUCTION ENGINEERING
Homework #4 – Due Date: May 26, 2016

1. Refer to the *Facilities Building 8 Bid Set* and *Facilities Building 8 Project Manual* documents in the Facilities Building 8 folder on the course website to answer the following questions:
 - a. Identify the “Door Key” located on Sheet: “Opening, Elevations, Notes, and Details”. Draw the door key and identify what each part of the symbol represents.
 - b. Refer to Sheet A1.0:
 - i. What is the Sheet Title?
 - ii. How many doors are shown on this drawing?
 - iii. Which doors require a fire rating (identify the door(s) with appropriate symbol) and what is the fire rating for the door(s)?
 - c. Refer to Sheet – *Exterior Elevations*
 - i. What is the Sheet Number?
 - ii. What scale was this sheet drawn in?
 - iii. Which Elevation Rendering shows a Note about “Dock Bumpers”?
 - d. Using the Facilities 8 Project Manual:
 - i. What Division discusses Loading Dock Bumpers?
 - ii. Identify the section number for Loading Dock Bumpers.
 - iii. Who are the two manufacturers that are specified that can provide Loading Dock Bumpers?
 - iv. What is the vertical height and length of the installed bumpers?
2. A private foundation wants to estimate the construction cost of building a library in Miami, Florida in the year 2008. A similar project that the foundation funded in 1998 in Chicago, Illinois cost \$105 per SF. However, the Miami library is expected to be 40% larger than the one in Chicago. Assuming a capacity factor of 0.8 and an inflation rate of 2.8%, what will the new library cost?
3. Using the information provided in Figure 1 of the reference sheet handout in class, estimate the combined design-construction cost of a High School with a total area of 120,000 SF, decorative concrete blocks in the exterior walls, a reinforce concrete framing system, 14’ story height, two elevators or 2,500 pound capacity each, and two 40’ height aluminum flagpoles. Also calculate how much more it would cost to include a 10,000 SF basement.
4. Explain the difference between unit-cost estimating methods and resource enumeration methods. When would you use unit cost? When would you use resource enumeration?
5. Using the average-end-method, using a spreadsheet, calculate the cut and fill volumes for stations 25+00 through 31+00. Use the information provided in the table below:

Station	End-Area Cut (SF)	End-Area Fill (SF)
25+00	0	3,525
26+00	355	985
27+00	786	125
28+00	2,515	55
29+00	1,255	23
29+25	620	0
29+50	25	845
30+00	0	3,655
31+00	0	8,560

6. The topographic plan given below, which shows a site that has a 20-ft x 20-ft grid layout, is being used to construct a 60-ft by 40-ft garage (SHOWN IN GRID A to C and 4 to 7). The elevation of the existing grade is shown at each intersection point on this grid for the new building and surrounding plot. Using a spreadsheet, calculate the volume of cut and the volume of fill in cubic yards required to level the entire site encompassed by grid area A to D by grids 3 to 8 to a new grade of 101.5-ft.



Topographic Plan with Grid (20-ft x 20-ft)

7. The estimate for a five-story office building included 72 doors on each of the upper three floors. In developing the bid, the estimator used a production rate of 2.0 carpenter man-hours to hang a door. The project superintendent is organizing the carpenter crews to include three carpenters per crew. What is the duration (in days) of the activity for one crew to hang all the doors on the upper three floors? Assume an 8-hr work day.
8. Compute the average hourly cost of a carpenter to a contractor. Assume the work is in a subsistence area and the daily subsistence rate is \$19.50. The carpenter works the second shift on a two-shift project where a project labor contract establishes a “work 7 pay 8 hour” pay basis for straight time. He works 6 days, 10 hours per day. In addition to time and a half for overtime Monday through Friday, the contract calls for double time for all work on weekends. Use 6.2% for FICA and 5.0% for unemployment insurance. Assume all data relating to the WC, PL, PD, fringes, and wage are as given in Figure 15.5 in the textbook.
9. Develop a (i) bar chart and (ii) an activity-on-arrow (AOA) diagram for the following project. Identify all potential critical activities on the bar chart. Using the AOA diagram, (i) identify the critical path, and (ii) calculate the total float, free float, interfering float, and independent float for each activity.

Activity	Activity Description	Duration	Preceded By
A	Drill Well	4	--
B	Construct Power Line	3	--
C	Excavate	5	--
D	Deliver Material	2	--
E	Pump House	3	A
F	Assemble Tank	4	D
G	Install Pump	2	B, C, E
H	Install Pipe	6	C
I	Foundation	4	C
J	Erect Tower and Tank	6	F, I