PROJECT BLOCK

8.1

Alcova Dam

Project Block Guidelines

▶ **Alcova Dam Problem**

The Problem

You have been assigned to write a report on an engineering project for your company. The project is the Alcova Dam that was built in the 1930's by the U.S. Bureau of Reclamation in Wyoming. To do this, you need to:

1. Research and record data about the dam on the Internet.
2. Update your Excel Dam Ratings Curve assignment (Block 4.2) to show the actual data on the Alcova dam.
3. Gather and organize information on that dam and create a complete report using Excel, Word and Photoshop.

Reference Materials

Block_4.2–Dam_Rating_Curve.xls
Internet Search Engines
ALCOVA TEXT.txt

The Steps
1) Go to the Internet.

   a) Search for and go to the *United States Bureau of Reclamation (USBR)* Homepage.

   b) Click on the **DataWeb** link.

   c) Click on the **Dams & Reservoirs** link.

   d) Select the **Alcova Dam**.
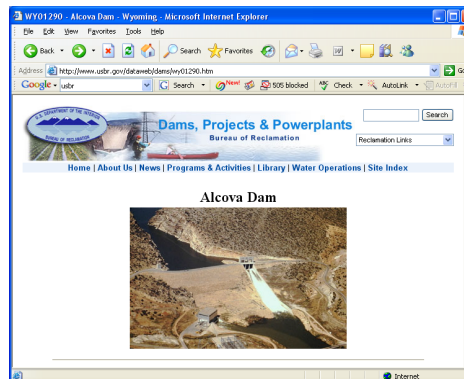
   e) This page contains several charts of data. You will need to refer to these charts in the following steps.

2) Open the Excel program and your problem, *Block_4.2–Dam_Rating_Curve.xls* from Week 4.

   a) Save it as **Block_8.1-Alcova_Dam.xls**.

   b) Update the Header and footer information.

   c) Modify the input data in your "Given" section as follows:

      i) Starting WSEL = *Begin with a water depth of 5 feet. From the Internet, refer to "Streambed at Dam Axis" to determine this elevation.*
Hint: "Streambed at Dam Axis" is the same as the bottom of the dam.

      ii) WSEL Increment = 10 feet

      iii) Final WSEL = *Find "Normal Water Surface Elevation" from the Internet.*

      iv) Bottom of Dam Elevation = *Find "Streambed at Dam Axis" from the Internet.*

      v) Spillway Elevation = *Find "Spillway Crest" from the Internet.*

      vi) Spillway Length = 90 feet

      vii) Spillway Coefficient, C_w : *(leave this as is for now, you will modify this later)*

      viii) Centerline of Pipe Elevation = 5,340 ft

      ix) Discharge Pipe ϕ : *(leave this as is for now, you will modify this later)*

      x) Area of Pipe = *Use same circle area formula.*

      xi) Discharge Pipe Coefficient, C_o = 0.6
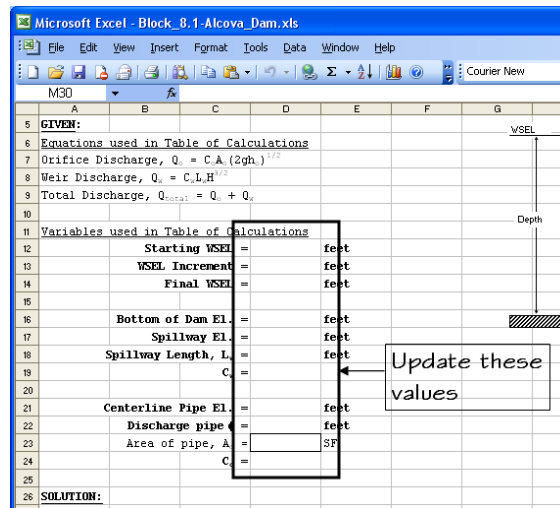
   d) Change the table of calculations heading to:

      "**ALCOVA DAM Table of Calculations**"

   e) Notice that the last two rows of the table of calculations goes beyond the "Final WSEL".

      i) Delete the last two rows of the table of calculations.

      ii) Fix the borders of the table.
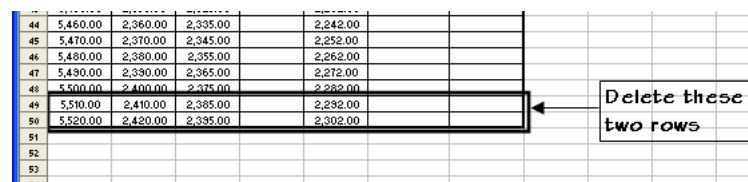
f) To find the correct Spillway Coefficient (C_w)

   i) From the Internet, find and write down the cfs value for "Capacity at Elev.: 5,500 ft". This value is the approximate amount of water that will cross the dam's spillway when the water surface elevation is at 5,500 feet. In our table of calculations, we call this our "Weir Discharge, Q_w, cfs".

ii) Now adjust the Spillway Coefficient, C_w, in the "Given" section until the calculated Weir Discharge, Q_w, is within ±10 cfs of the value you found in the previous step. Keep adjusting the C_w value manually to 3 decimal places.

   Note: This step is assuming that your table is entirely setup using correct formulas. If not, your table will not update correctly.

g) To find the correct Discharge Pipe Diameter, φ.

  i) From the Internet, find and write down the cfs value for "Outlet Works Capacity at Elevation 5,498 ft." This value is the discharge pipe's output (Q_o) when the water surface elevation is 5,498 ft.

  ii) Notice that our table of calculations does <u>not</u> have a water surface elevation (WSEL) of 5,498 feet. You will need to add a row for this elevation. Copy any row of the table and insert it in between WSEL = 5,490 ft. and WSEL = 5,500 ft.

	A	B	C	D	E	F	G	H	I	J	K
26	SOLUTION:										
27											
28			ALCOVA DAM Table of Calculations								
29	WSEL	Depth	Pipe Discharge		Weir Discharge		Q_{total}				
30	feet	feet	h_o, ft	Q_o, cfs	H, ft	Q_w, cfs	cfs				
31	5,330.00	5.00	0.00		0.00						
32	5,340.00	15.00	0.00		0.00						
33	5,350.00	25.00	10.00		0.00						
34	5,360.00	35.00	20.00		0.00						
35	5,370.00	45.00	30.00		0.00						
36	5,380.00	55.00	40.00		0.00						
37	5,390.00	65.00	50.00		0.00						
38	5,400.00	75.00	60.00		0.00						
39	5,410.00	85.00	70.00		0.00						
40	5,420.00	95.00	80.00		0.00						
41	5,430.00	105.00	90.00		0.00						
42	5,440.00	115.00	100.00		0.00						
43	5,450.00	125.00	110.00		0.00						
44	5,460.00	135.00	120.00		0.00						
45	5,470.00	145.00	130.00		10.00						
46	5,480.00	155.00	140.00		20.00						
47	5,490.00	165.00	150.00		30.00						
48	**5,498.00**	173.00	158.00		38.00						
49	5,500.00	175.00	160.00		40.00						
50											
51											

Insert new row here

  iii) Change the WSEL value to 5498, and make this value bold. This will indicate that the value is "hard coded", not a calculated value.

  iv) Keep adjusting the discharge pipe diameter (φ) until the calculated discharge pipe's output, Qo, is within **±1 cfs** of the "Outlet Works Capacity at Elevation 5,498 ft." Manually adjust the diameter to 3 decimal places.

|		
Spillway El. =	5,460 feet	
Spillway Length, L_w =	90 feet	
C_w =		
Centerline Pipe El. =	5,340 feet	
Discharge pipe φ =	feet	
Area of pipe, A =	SF	
C_o =	0.6	

Adjust pipe diameter

  v) Highlight the calculated pipe discharge value (Qo) at 5,498 ft. and the calculated weir discharge value (Qw) at 5,500 ft. with a heavy border and a yellow fill color.

|	A	B	C	D	E	F	G	H	I
27									
28			ALCOVA DAM Table of Calculations						
29	WSEL	Depth	Pipe Discharge		Weir Discharge		Q_{total}		
30	feet	feet	h_o, ft	Q_o, cfs	H, ft	Q_w, cfs	cfs		
31	5,330.00	5.00	0.00		0.00				
32	5,340.00	15.00	0.00		0.00				
33	5,350.00	25.00	10.00		0.00				
34	5,360.00	35.00	20.00		0.00				
35	5,370.00	45.00	30.00		0.00				
36	5,380.00	55.00	40.00		0.00				
37	5,390.00	65.00	50.00		0.00				
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43	5,450.00	125.00	110.00		0.00				
44	5,460.00	135.00	120.00		0.00				
45	5,470.00	145.00	130.00		10.00				
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48	**5,498.00**	173.00	158.00		38.00				
49	5,500.00	175.00	160.00		40.00				
50									
51									
52									
53									
54									

Highlight Cells

h) Update the Chart

    i) Change title to "**Rating Curve for ALCOVA DAM**".

    ii) Modify the scale of the x-axis (i.e. WSEL, feet).

    iii) Modify the scale of the y-axis (i.e. Discharge, cfs).

    iv) Add medium line **CHART** border.
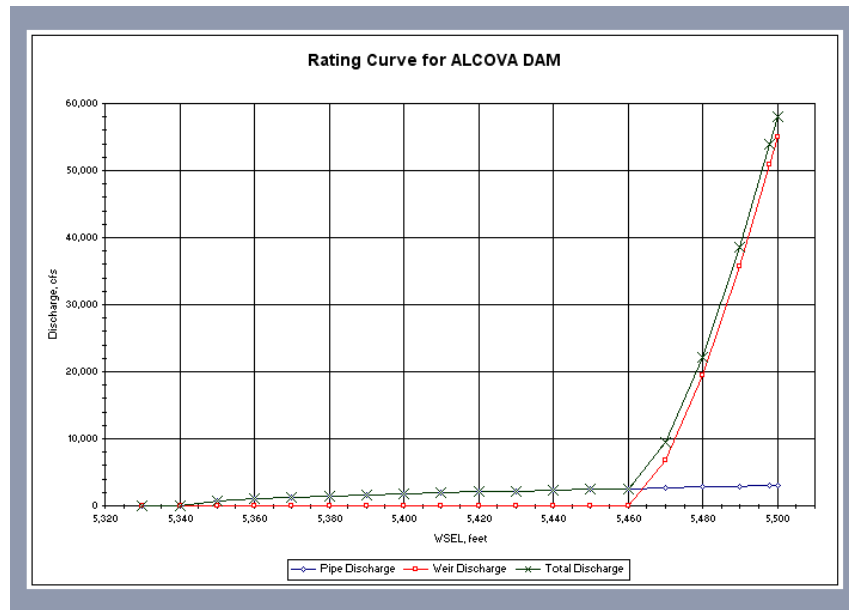
i) Save the file and keep Excel and the ALCOVA DAM workbook open

3) Open your Word template (Block_7.1-Word_Template.doc).

a) Save As: **Block_8.1-Alcova_Dam_Report.doc**.

b) Update the Header and Footer information as appropriate.

c) Enter page setup and select the Layout tab. Under Headers and Footers, check **Different First Page**. This will prevent the header and footer from printing on the cover sheet.
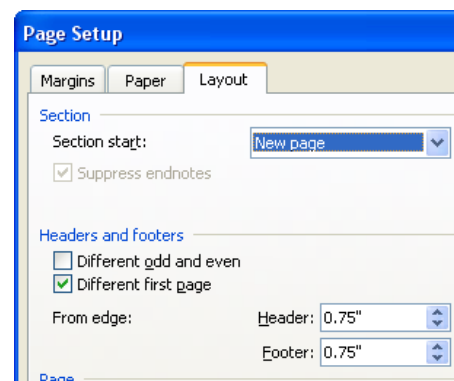
4) Create a cover sheet on the first page by using the example as a guide.

   a) Feel free to use a different font than the one shown.

   b) Include at least one image of the dam.

   c) Do **NOT** include the table of contents yet. This will be added later.

ALCOVA DAM
REPORT

[Your Name]
Computing Tools for
Engineering Technology
October 24, 2005

5) Start a second page and create a heading "**Background**".

   a) Download the "Alcova Text" file from MyCourses, and import it into your Word document under the Background heading.

   b) Add paragraphs where appropriate.

   c) Use the **Spelling and Grammar** tool to help find spelling errors.

   d) Include another image of the dam. (Use **Format – Picture – Layout** to adjust the location of the picture in the text.)

6) Start a third page and create a heading "**Location**".

   a) Find map images showing the location of the Alcova Dam in Wyoming.

      i) Get map images from the Internet. There are many resources on the Internet, but www.mapquest.com and maps.google.com seem to work well.

      ii) Search for "Alcova, Wy". You may need to zoom in, zoom out or pan to get the right image.

      iii) Include at least one satellite image from maps.google.com.

      Note: maps.google.com does not allow you to "right-click" on its image. You can copy the whole window by using Ctrl-Alt-Print Scrn. You will then need to crop the image.

   b) Create a new document in Photoshop and create a composite of the map images you retrieved from the Internet.

      i) Add circles and arrows as needed to show the actual location of the dam.

      ii) Use the example as a guide, but your map does not need to match exactly. Show some creativity here.

   c) Save your composite image as a jpg file and insert into your Word report.

7) Start page four, and create the heading "**<u>Statistical Data</u>**".

   a) In your Alcova Dam Excel worksheet, highlight the input data in the "Given" section.

   b) Copy and paste your selection into your Word document under the Statistical Data heading.

   c) Return to your Excel worksheet, and select the diagram that you created. **Use the selection tool from the drawing toolbar**.
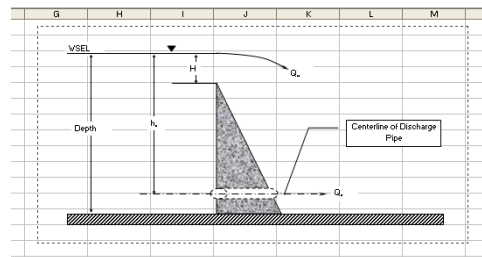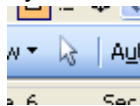
   d) Copy the diagram and paste into your Word document under the input data as shown in the example.

   e) Make sure the input data and the diagram fits on one page. Adjust their size as necessary.

8) Start page five, and create the heading "**<u>Table of Calculations</u>**".

   a) In your Alcova Dam Excel worksheet, highlight the Table of Calculations.

   b) Copy the table and paste into your Word document under the Table of Calculations heading.

   c) You may need to adjust the column widths as necessary to make the entire table visible on the page.

      NOTE: If you see '######' in your table, you will need to return to Excel, increase the width of the column and copy and paste the table into your Word document again.

9) Start page six, and create the heading "**Discharge Chart**".

a) Change to orientation of this page to **Landscape**.

b) Modify the tab locations for the header and footer to match the page orientation. **Modify the header and footer for this section only!** (*i.e., turn off "Link to Previous."*)

c) In your Alcova Dam Excel worksheet, select the chart and copy to your Word document.

d) Adjust the chart size as necessary.
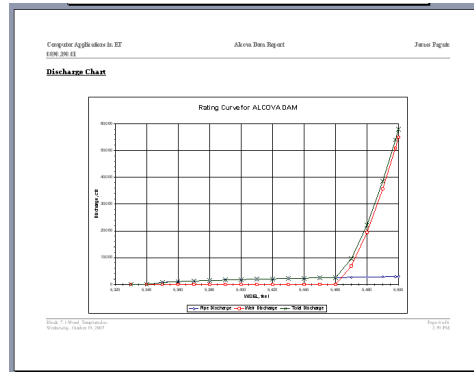
NOTE: *If your chart title does not show up in Word, it may be because you used the Chiller font in Excel and that font may not be available Word. If that is the case, change the font in Excel and copy the chart again.*

10) Create the table of contents on the cover sheet (*page 1*) by following these steps:

a) Display the "Outlining" toolbar. (***View – Toolbars – Outlining***)

b) Highlight each of the headings in your report and assign it to "Level 1" in the Outlining toolbar. (*You should have a total of 5 headings.*)

c) Return to the first page and place your cursor at the bottom of the page.

d) Select **Insert – Reference – Index and Tables – Table of Contents**.
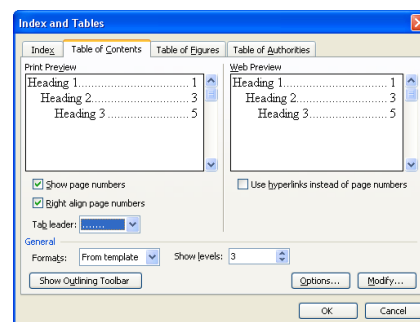
e) Make sure **Show page numbers** and **Right align page numbers** are both checked. Select **OK**.

f) Add a header, "**Table of Contents**".

g) Adjust the Left Indent and the right tab location of the header and the table of contents.
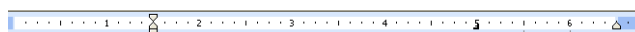
Table of Contents

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11) Print and submit both "**Block_8.1-Alcova_Dam_Report.doc**" and "**Block_8.1-Alcova_Dam.xls**" to your instructor through the MyCourses Drop Box.