

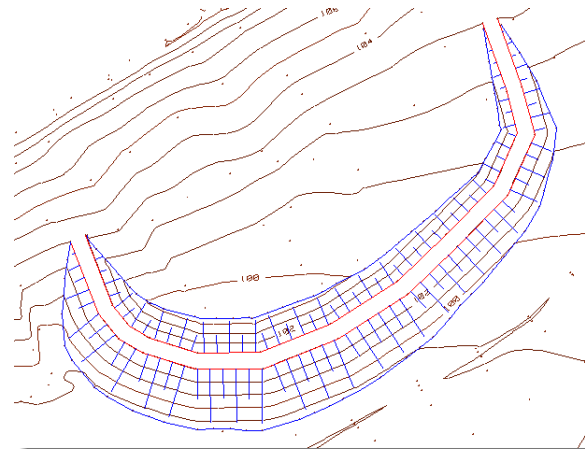
How to determine the water volume in a dam

Introduction:

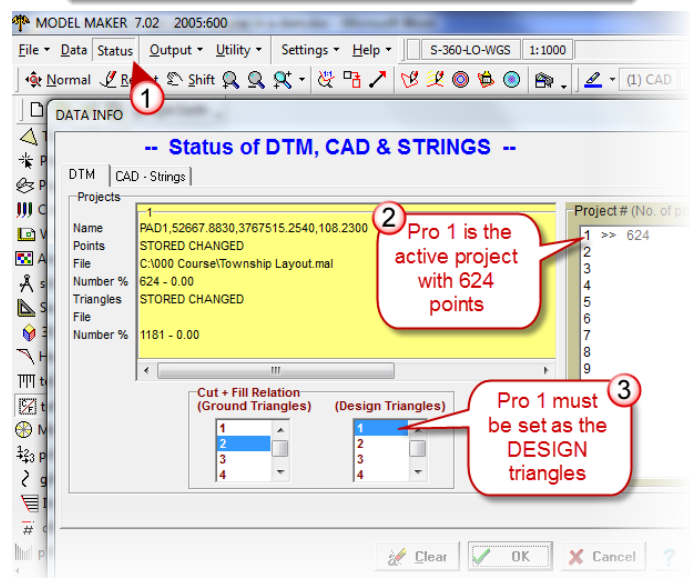
Let us assume you have surveyed a client's dam and would now need to determine how much water is in the dam. Yes you may pull out the planimeter and calculate the volume using the and-area rule, or you can use Model Maker to determine the water holding capacity of a dam at it's full level and at any other water level in a few easy steps.

Step 1: Survey the dam basin and triangulate the model as usual until the model represents the dam area with proper contours.

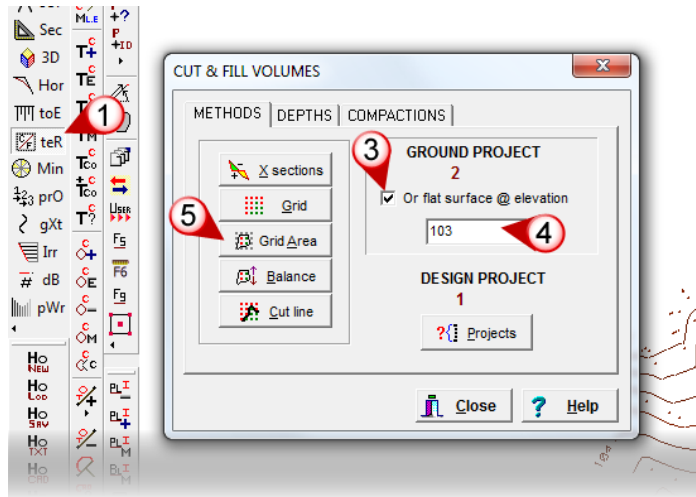
Survey Tip: if the dam has water in it when you do the survey, use a boat and a long prism pole with a base plate (so that the pole can be positioned on top of the silt on the basin)



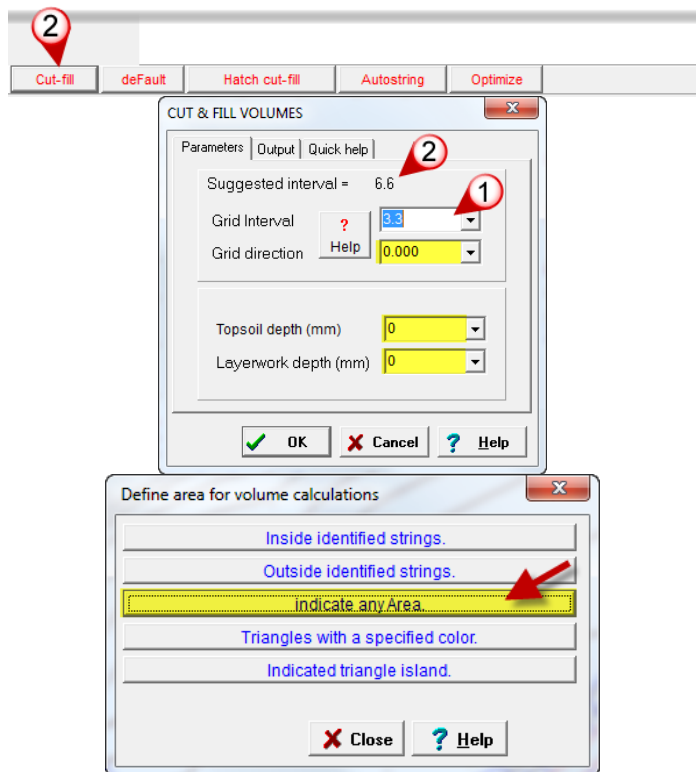
Step 2: Set the ground/design relation using the status menu



Step 3a: Click on Ter (1) Cut-fill (2) and make sure the surface to calculate to is a flat surface (3) which in this case will be the dam overflow level (4), then select Grid Area (5) to indicate the surface area of the dam.

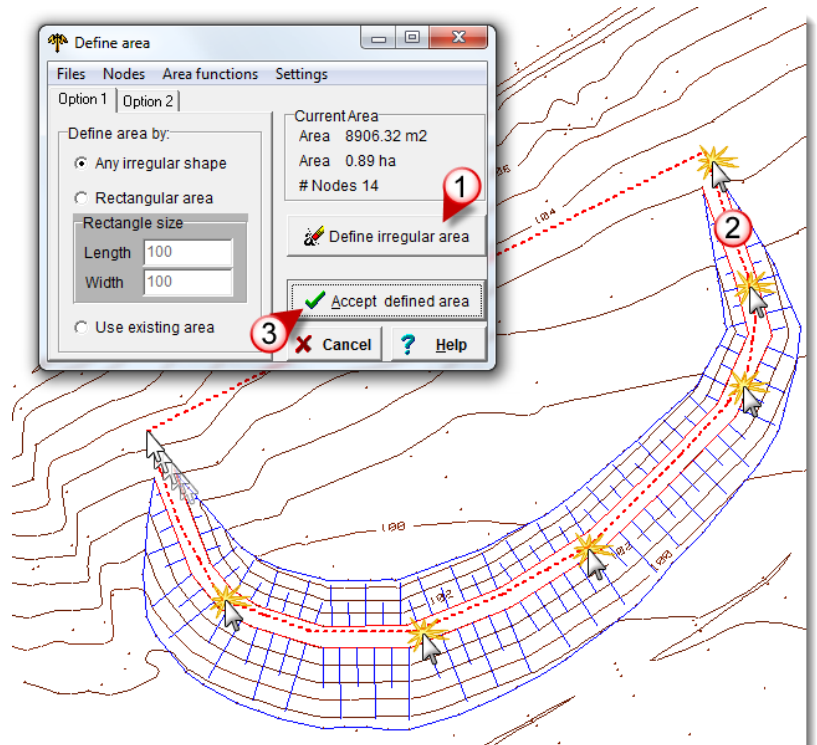


Step 3b: Set the Grid interval (1) to roughly half of the suggested (2) interval. Taking note that the grid direction, layer and topsoil depths are all zero values.



Step 3c: Using the "indicate any Area" option you will now define the perimeter of the calculation.

Step 3d: Define the area (1) by clicking on the perimeter (2) of the highest points around the dam making sure that you stay on the stream-up side of the dam. This is crucial for accurate volumes, so make sure you stay on the correct side of the dam. Accept (3) the defined area when you are satisfied.



Step 4: If all went well, you will see a red grid indicating the cut area from the full water level downward to the dam basin. In the dialog that pop up, enter a volume description if you like and press OK to reveal the actual water volume. You will be concerned about the CUT volume. The fill volume should be ignored in this instance.

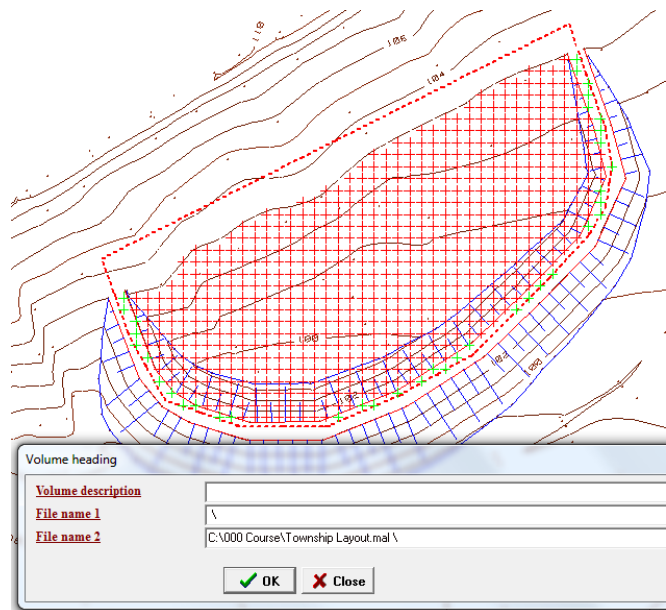
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MODEL MAKER
1 1 Date : 4/10/2010 Time : 11:47
File 1 \
Volumes calculated to Fixed level of 103.00m
System Settings : S-360-LO-WGS

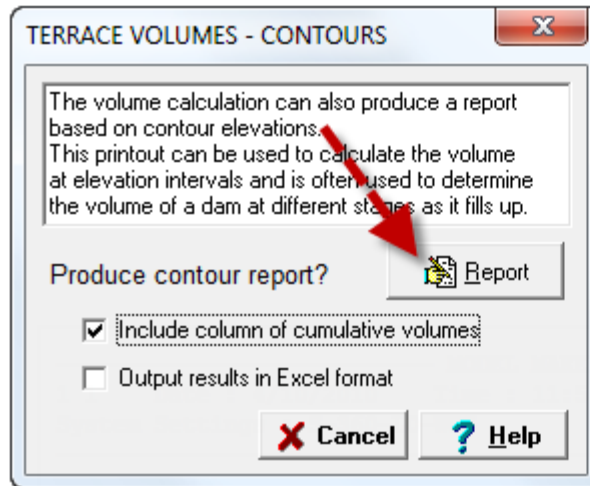
VOLUME CALCULATIONS DONE ON A GRID OF 3.30 X 3.30m
VOLUMES CALCULATED WITH NO COMPACTION FACTOR
TOPSOIL OF DEPTH :0mm REMOVED
LAYERNWORK OF :0mm DEDUCTED

  DEPTH m          CUT m3          FILL m3
0.00 to 0.50 :    3312.34          449.59
0.50 to 1.00 :    2756.20          159.25
1.00 to 1.50 :    2216.99           33.90
1.50 to 2.00 :    1625.68           1.47
2.00 to 2.50 :    1021.88           0.00
2.50 to 3.00 :     476.61           0.00
3.00 to 3.50 :     134.29           0.00
3.50 to 4.00 :       1.70           0.00

FINAL CUT AREA : 7176.51m2 | CUT VOLUME : 11545.69m3
FINAL FILL AREA : 1285.02m2 | FILL VOLUME : 0.00m3
  
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Step 5: When you close the first report, a second report option is displayed, this report is often overlooked, but here you will see a report for the dam detailing the volume at any other water level which is an excellent value add to your client should you place a marked pond marker in the dam.



Number	Between contour & contour (m)		Volume per contour	
			Cut m3	Fill m3
6	99.000	99.500	1.698	0.000
7	99.500	100.000	134.289	0.000
8	100.000	100.500	476.609	0.000
9	100.500	101.000	1021.880	0.000
10	101.000	101.500	1625.681	0.000
11	101.500	102.000	2216.991	0.000
12	102.000	102.500	2756.205	0.000
13	102.500	103.000	3312.342	0.000
14	103.000	103.500	0.000	449.588
15	103.500	104.000	0.000	159.252
16			0	