

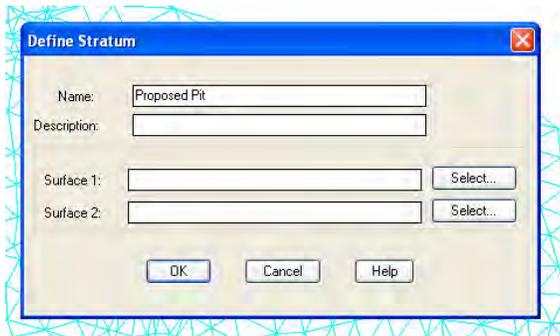
CALCULATING VOLUMES BETWEEN TERRAIN SURFACES

In this example, two terrain models have already been established, one for existing ground (named "Ognd") and another for a proposed pit (named "Pit"). The following steps are for calculating volume of cut and fill between the two surfaces. Note that the Pit surface must tie into the Ognd surface and be located completely within boundary of the original ground terrain surface.

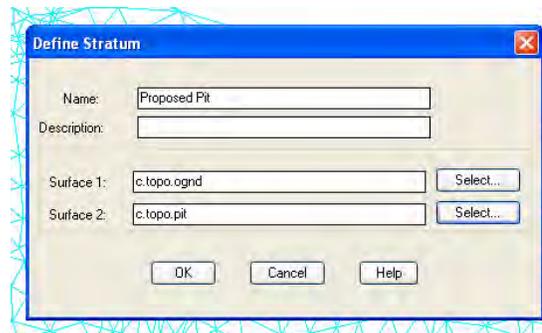
1. Define a site for the project if one has not been defined yet. See the procedure for defining a site if this has not been done.
2. Select the terrain surfaces to calculate volumes between.
 - a. Go to the Select Current Stratum option under the Terrain drop-down menu.



- b. A window will appear with the title Define Stratum. Give the stratum a name and also a description if needed.



- c. Next, select the two surfaces that you want to calculate volumes between. When doing so, assign the surface which represents original or existing conditions to Surface 1 (in this case Ognd) and the surface representing proposed conditions to Surface 2 (in this case Pit). To select a terrain surface, click on the Select... button next to either Surface 1 or Surface 2. Click on OK when you are through making selections to return to the drawing.



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3. Sample sections for calculating volumes

There are three methods that can be used to calculate volumes--Grid, Composite, and Section. The following is an overview of the different methods.

Grid: The Grid method calculates volumes using a grid overlaid on the two surfaces that comprise the current stratum. The size of the grid cells is dependant on the M and N size that you specify when you set up the site. This method calculates the volumes by using the prismatic volume of all grids and summarizing. This method requires quite a bit of computer memory and is most accurate when the grid spacing is less than the average surface data spacing.

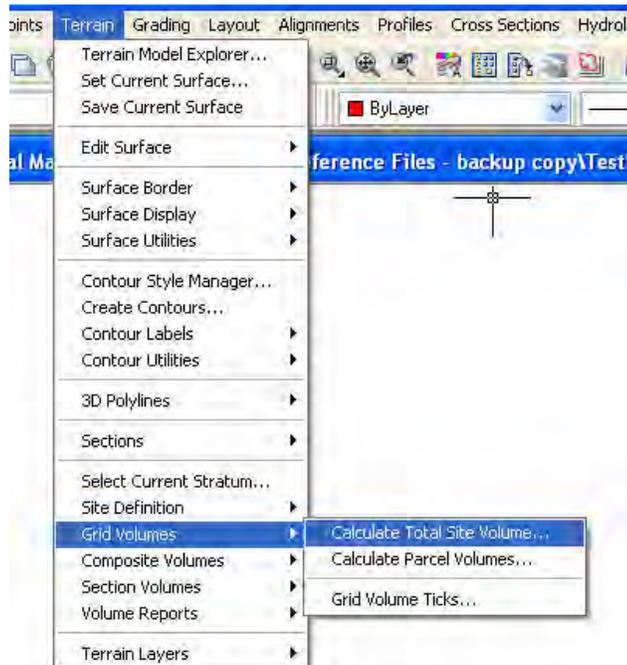
Composite: The Composite method is the most accurate of the three methods and the fastest to run. This method re-triangulates a new surface based on points from both surfaces. It uses the points from both surfaces as well as any location where the triangle edges between the two surfaces cross. The command then calculates the new composite surface elevations based on the difference between the elevations of the two surfaces.

Section: The Section method calculates cross sections from the two surfaces of the current stratum and generates volumes using either the Prismatic or Average End Area method. This method is rather slow because the program must sample 100 sections for each of the two sections being used in the volume calculation. This is also the only method which does not create a volume surface in Terrain Model Explorer.

All three methods of calculation are covered below.

4. Grid method of calculating volumes

- a. Choose Calculate Total Site Volume under the Grid Volumes option in the Terrain drop-down menu.

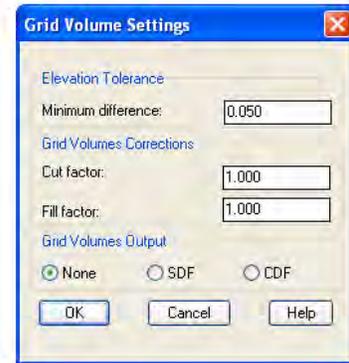


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- b. Select the site (there is normally only one unless you have defined multiple sites for a project).

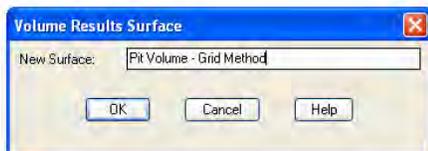


- c. The Grid Volume Settings window will appear next. The elevation tolerance factor determines how large a difference in elevation must exist between the two surfaces in order to be included in volume calculations. The volume commands compare the two surfaces at each grid node. If the difference in elevation between the two surfaces is less than the elevation tolerance at a grid point, then it is considered to be 0. You can also specify cut and fill factors to compensate for the expansion or compaction of the surface material. A factor of 1.00 does not adjust the volumes. You can also tell the program to write the volume calculation output to either a space delimited file (SDF) or a comma delimited file (CDF).

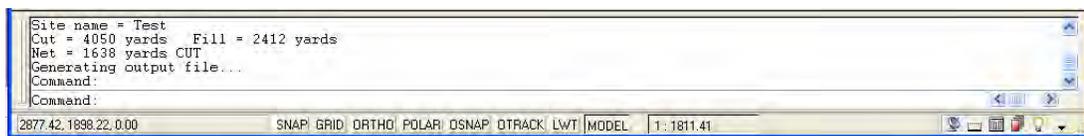


If you choose either SDF or CDF, a separate window will appear in which you can specify the settings for the output file. If you select None, the calculations will still be performed and a volume terrain created, but a separate output file will not be generated.

- d. The next window to appear will be the Volume Results Surface window. Provide a name for the volume surface that will be created and click OK to start the volume calculations.

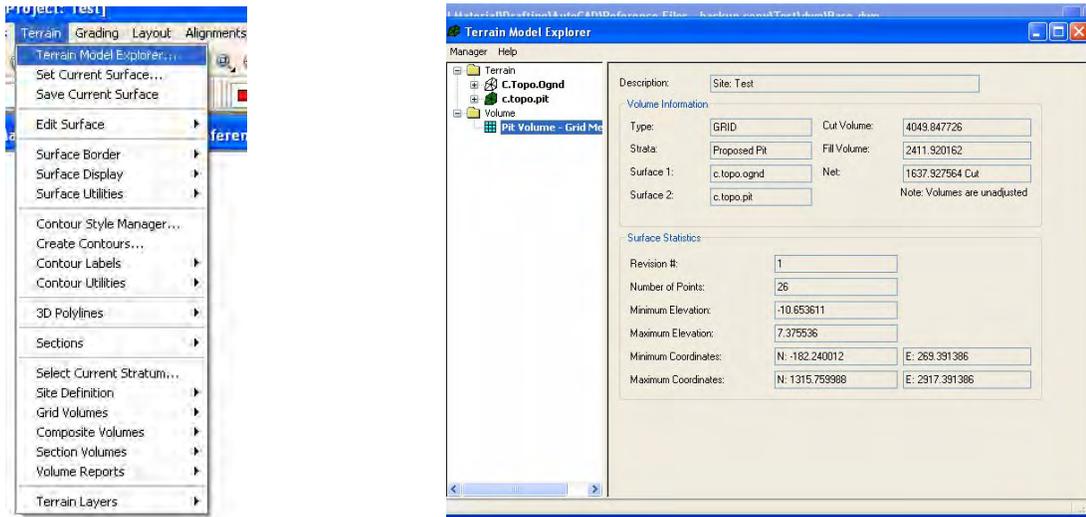


- e. The program will calculate the volume and display the results at the command line.



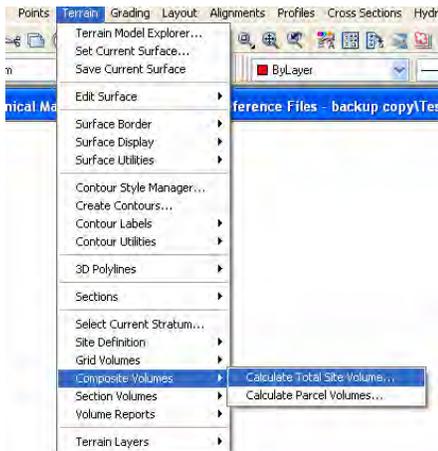
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- f. You can also view the summary of the volume surface that the program created through Terrain Model Explorer.



5. Composite method of calculating volumes

- a. Choose Calculate Total Site Volume under the Composite Volumes option in the Terrain drop-down menu.

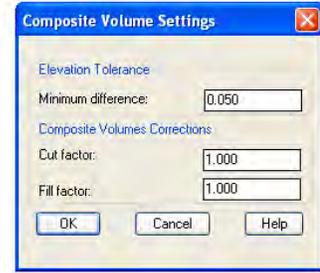


- b. Select the site in the Site Volume Librarian window.



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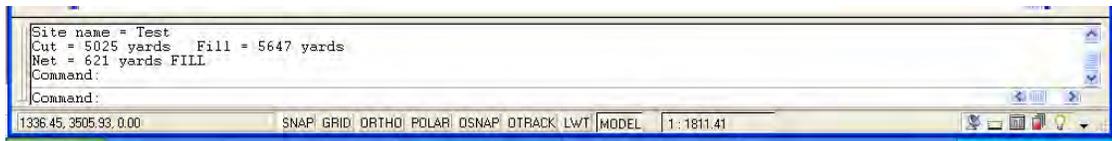
- c. The Composite Volume Settings window will appear next. The elevation tolerance factor determines how large a difference in elevation must exist between the two surfaces in order to be included in volume calculations. Again, you can specify cut and fill factors to compensate for the expansion or compaction of the surface material.



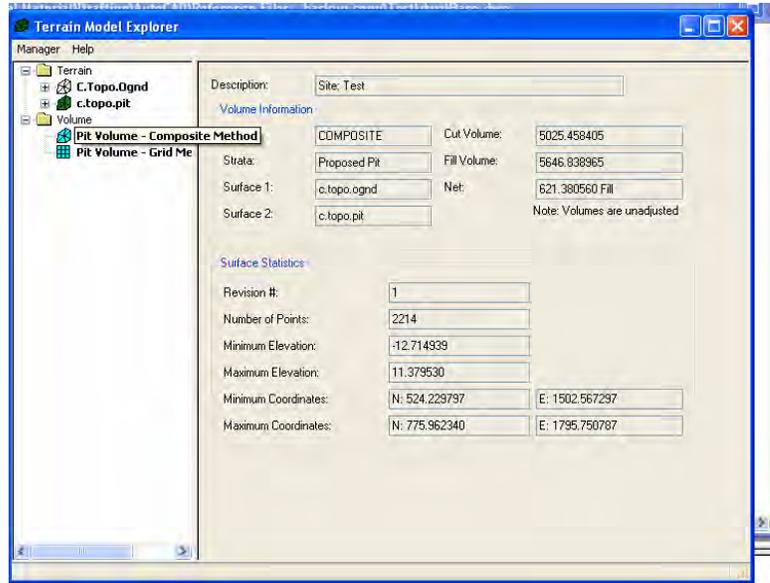
- d. Provide a name for the volume surface in the Volume Results Surface window and click on OK to start the volume calculations.



- e. Again, the program will calculate the volume and display the results at the command line.



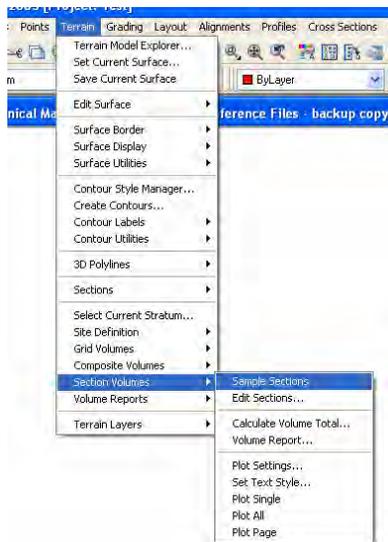
And in Terrain Model Explorer



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6. Section method of calculating volumes

- a. Choose Sample Sections under the Section Volumes option in the Terrain drop-down menu.



- b. Select the site in the Site Volume Librarian window.

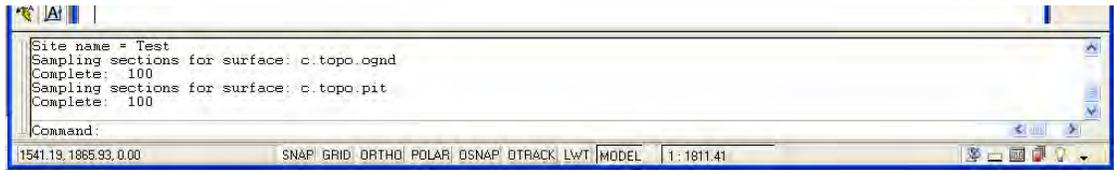


- c. In the Section Volume Settings window, you can specify the average end area or prismatic volume calculation type, and you can specify cut and fill factors. You can also tell the program to sample sections in either the M (x) or N (y) direction.

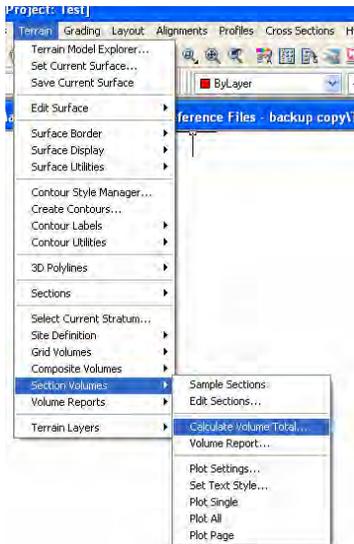


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- d. The program will sample 100 sections for each of the two surfaces that you defined in the strata. The progress of the sampling will be tracked at the command line.



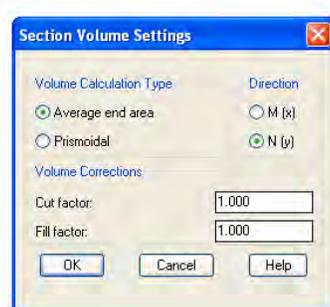
- e. Now that the sections have been sampled, you can calculate the volume total.



- f. Select the site again in the Site Volume Librarian window.

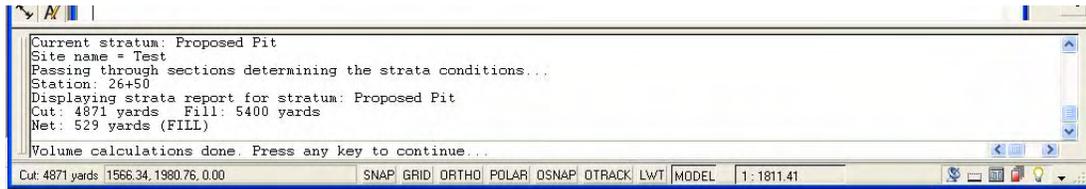


- g. And verify your selections in the Section Volume Settings window.

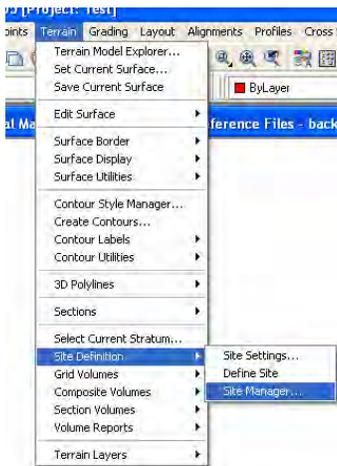


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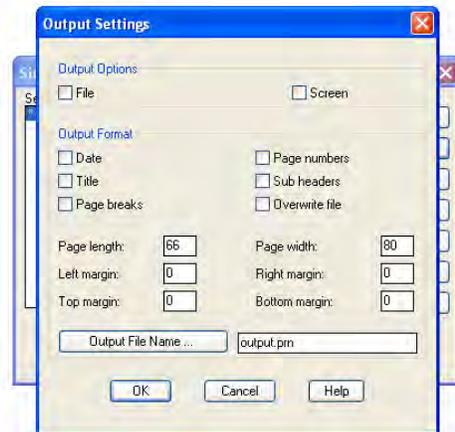
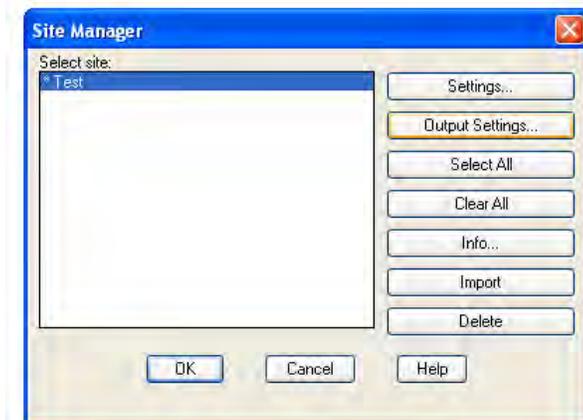
- h. The program will calculate a volume total for the sections that you previously sampled. The results will be displayed at the command line.



7. With the Sections method, a volume surface is not created, but you can create a text file with the details of the volume calculation. To specify the name and location where the output file will be stored, first go to the Site Manager under Site Definition in the Terrain drop-down menu.

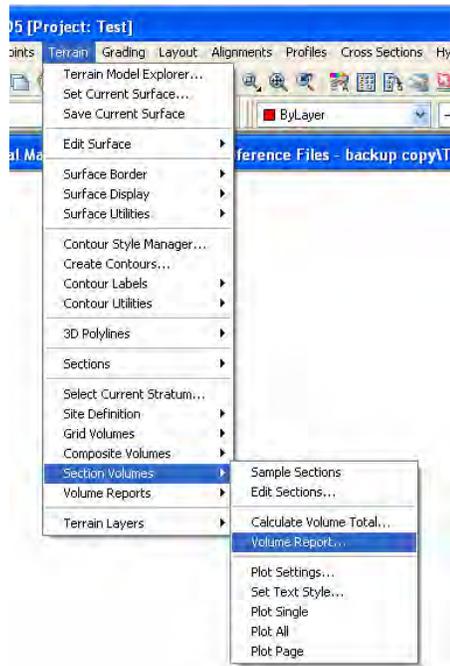


- a. Select the site and click on the Output Settings button. In the Output Settings window, you can choose whether the output will be written to a file or to the screen, and you can control the location and format of the output file.

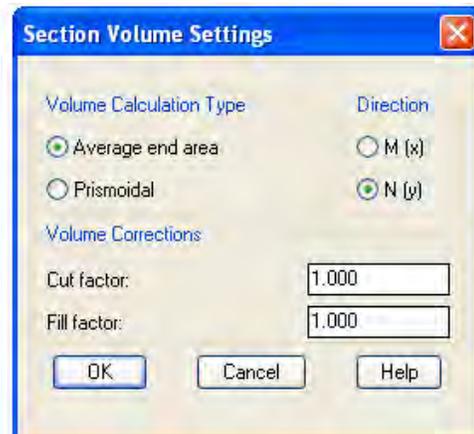


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- b. To create the volume report, select Volume Report in the Section Volumes option of the Terrain drop-down menu.



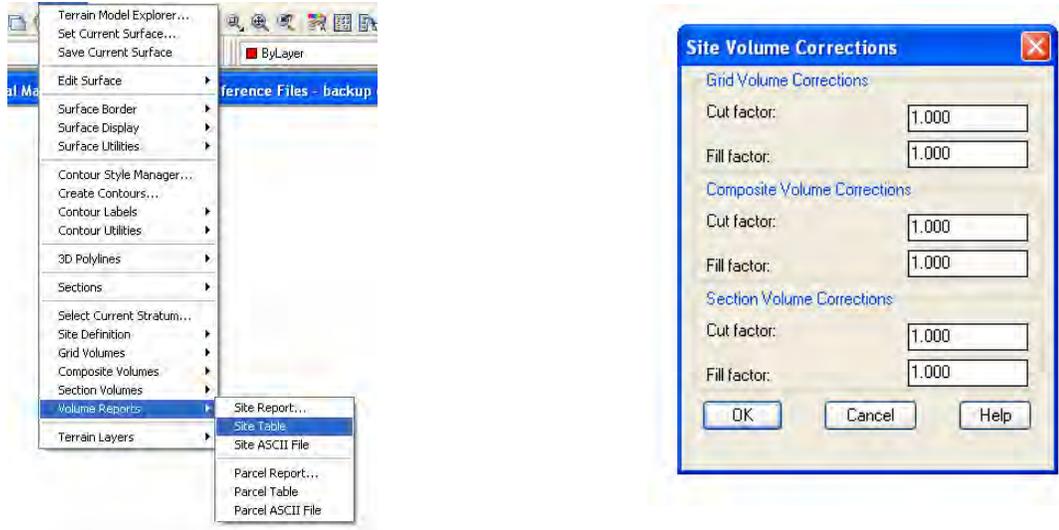
- c. Once again, you will be asked to select the site and to verify the section volume settings.



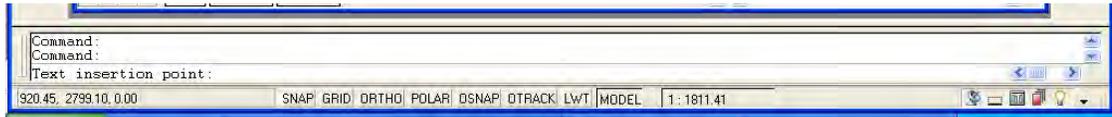
- d. The output file will be written either to the screen or to a file, depending on the output settings that you specified.

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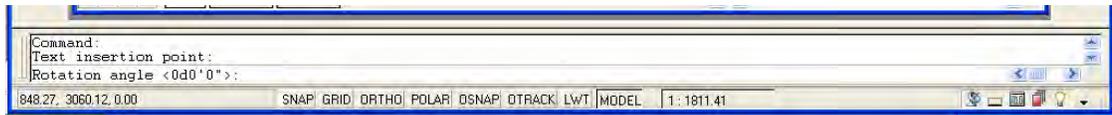
8. A table can also be inserted into the drawing which summarizes all of the volume calculations for the site. Go to Site Table under the Volume Reports option under the Terrain drop-down menu. Next, specify the volume correction factors for the various methods in the Site Volume Corrections window.



- a. Next, you will be prompted at the command line to select an insertion point for the table in the drawing.



- b. After you select an insertion point, you will be given an option of defining a rotation angle for the table.



- c. A summary volume report table will be inserted into the drawing.

