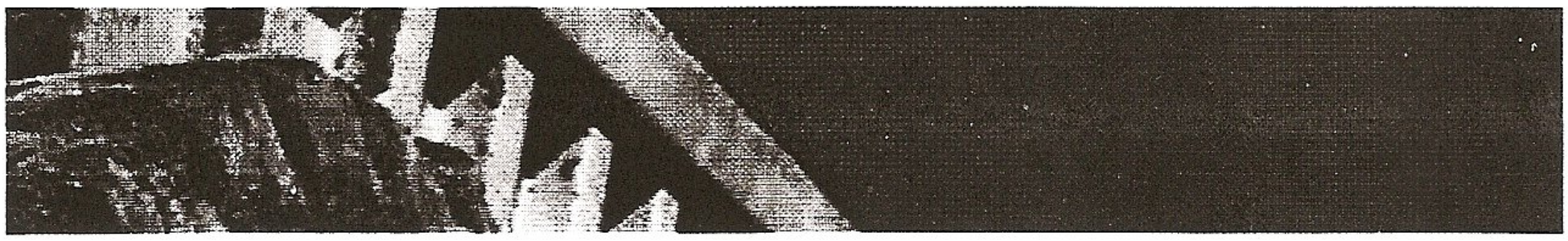


# Volume Calculation Methods

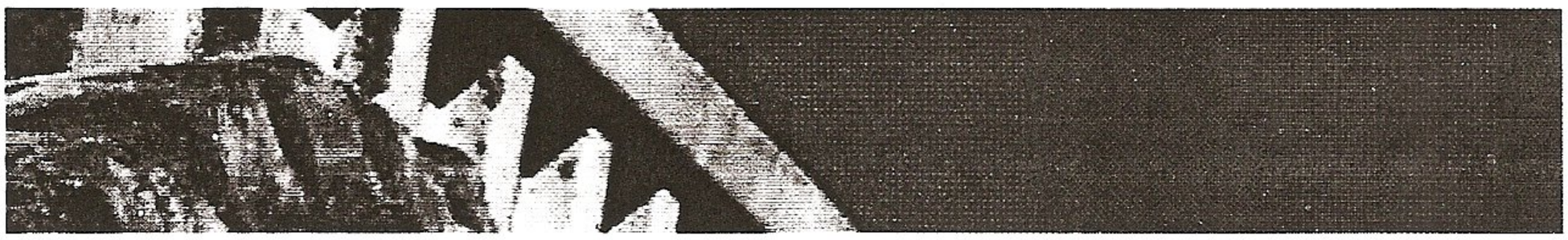
Autodesk Land Desktop provides three methods for performing volume calculations: Grid, Composite Surface, and Section (which can be done with both the Average End and Prismoidal methods).

Both the Grid and Section methods are approximations controlled by the grid spacing. Therefore, varying results may occur if the surfaces are either not sampled often enough or are sparsely populated with data. We recommend that when you use grid-based and average-end area (section) volumes, you make sure the grid spacing is not too small as to sample too often, and not too large as to result in an imprecise volume estimate. In any case, use all three volume calculation types (including different scenarios for each volume type) as redundancy checks. Use your own judgment when deciding which result is appropriate for the site.

The Grid and Composite Volume methods create volume surfaces that represent the depth of cut and fill. Any command that generates information based on a surface can be used with the volume surface. You can, for example, create contours or points based on depth of cut and fill. Volume surfaces are displayed in the Terrain Model Explorer.

Related topics

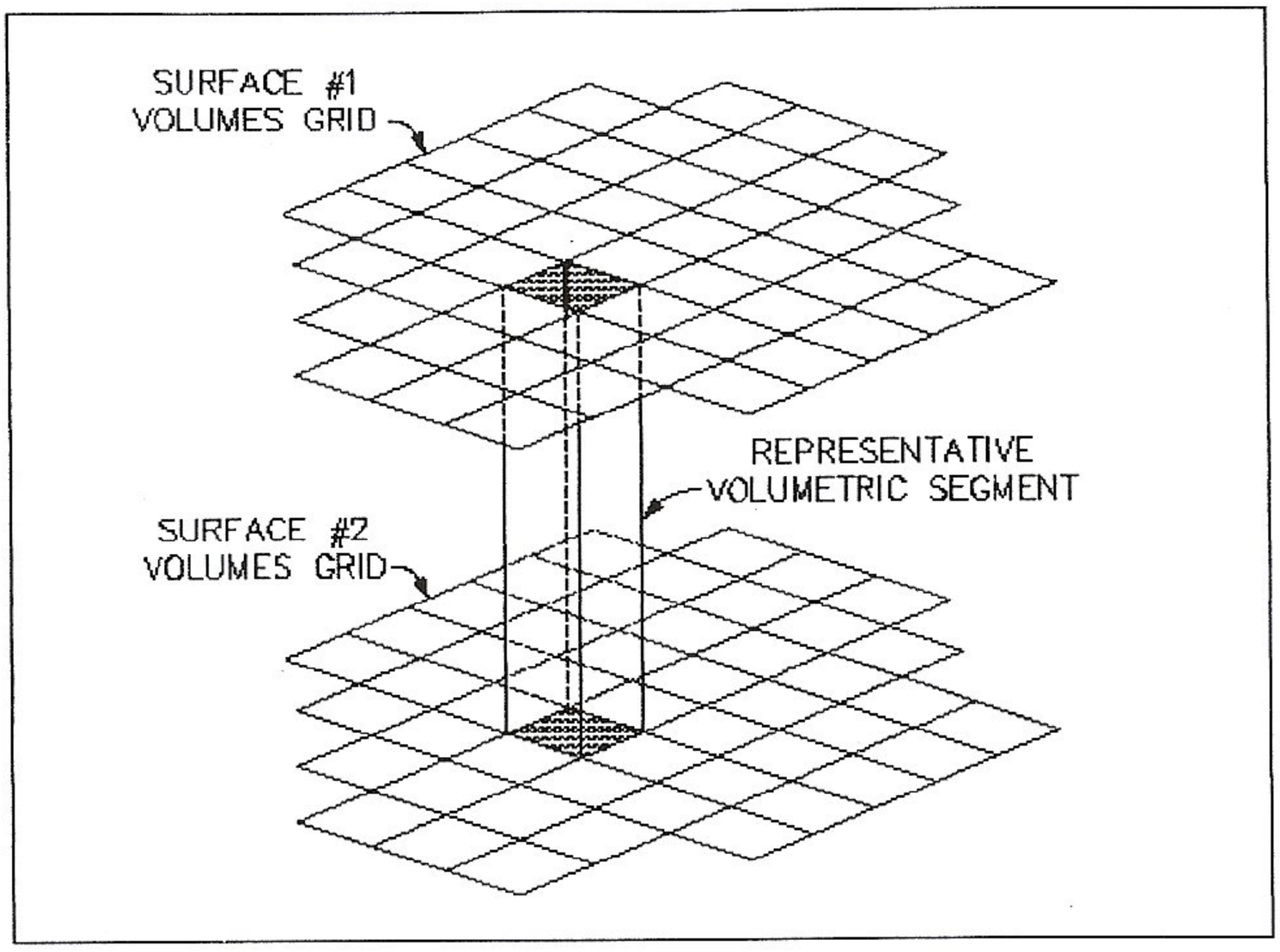
- Using the Grid Method
- Using the Composite Method
- Using the Section Method



# Using the Grid Method

The Grid method calculates volumes using a grid overlaid on the two surfaces that comprise the current stratum. This method calculates the volumes by using the prismoidal volume of all grids and summarizing. This method is most accurate when the grid spacing is less than the average surface data spacing.

The following illustration shows this process:

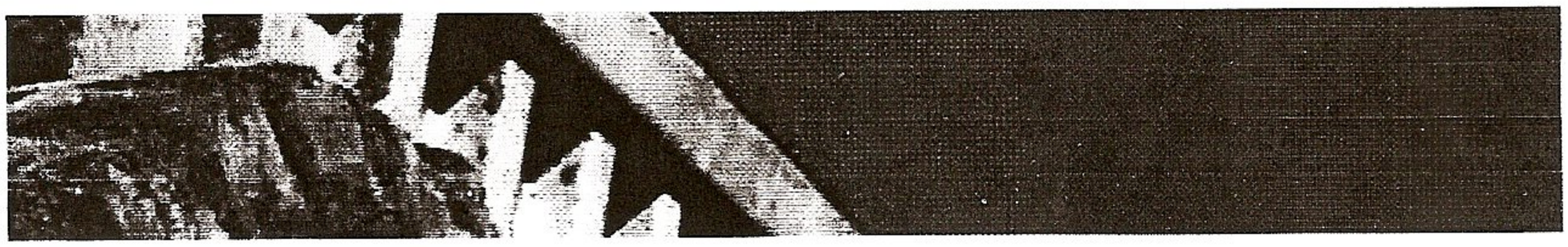



Grid method

The Grid method breaks the site into a series of grid cells in rows and columns that are determined by the Define Site command. For more information, see Defining a Site for Volume Calculations. The Grid method uses the M and N size that you specify when you define the site to determine the dimensions of the grid cells. The Grid method samples the elevations of the existing and proposed surfaces at the corners (or grid nodes) of each cell. It then breaks the resulting face into two triangular prisms. If any corner of the cell falls outside of the surfaces, then the entire cell area is discarded. The cells are then split into individual prismoidal objects.

The Grid method uses approximations controlled by the grid spacing. When you use grid-based volumes, make sure the grid spacing is not too large, which might result in imprecise volume estimates. In any case, you can use both the Grid and Composite Volume methods, and then decide which result is appropriate for the site.

**NOTE** You can import the cut and fill grid ticks to view the sampling locations for the grid volumes.



# Using the Composite Method

When you calculate the volumes using this method, instead of using a grid, the Composite 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

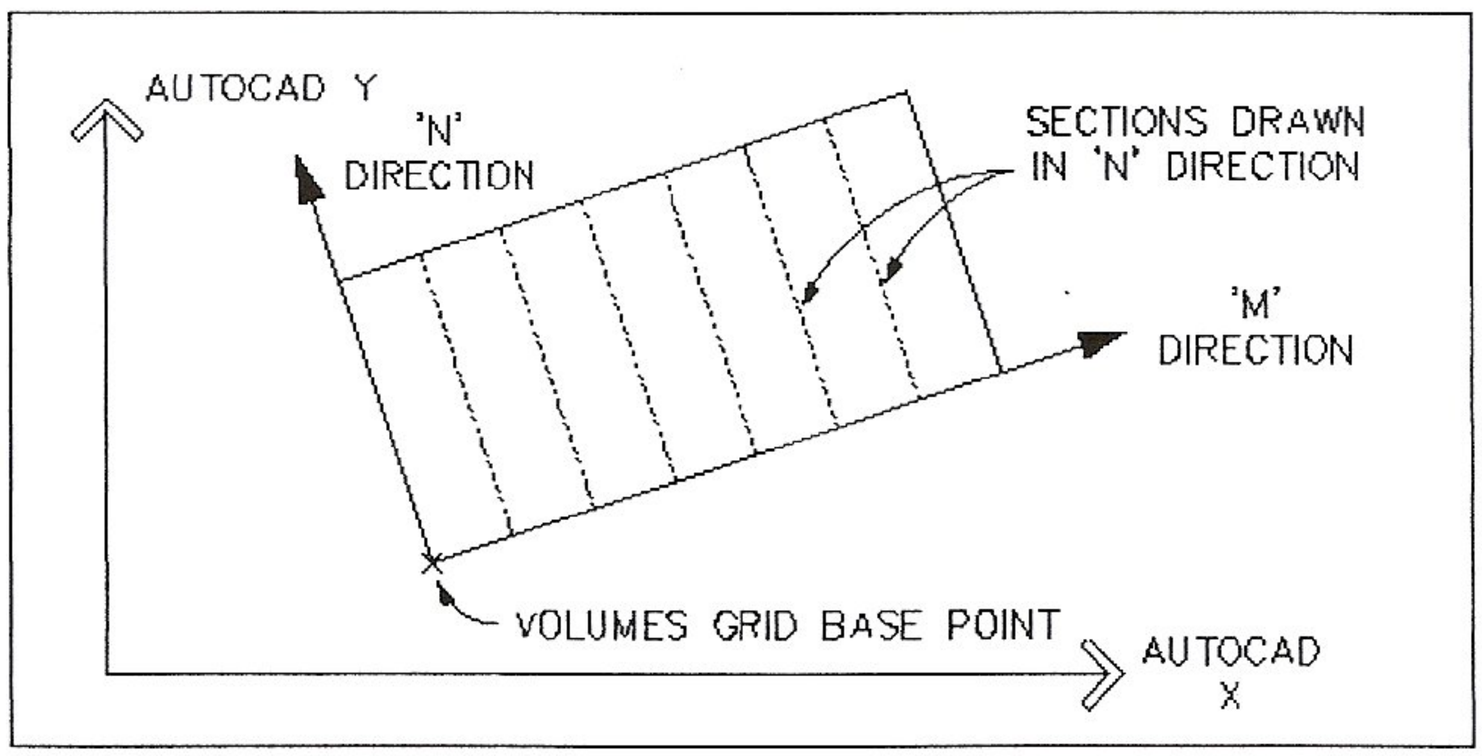
command then calculates the new composite surface elevations based on the difference between the elevations of the two surfaces.

This method is the most accurate, giving the exact volumes between the two surface definitions.

# Using the Section Method

The Section method calculates cross sections from the two surfaces of the current stratum, and generates volumes using either of two methods: Prismoidal or Average End Area. You can interpolate sections in either the M or N direction, with spacing based on the grid spacing of the defined site. You can then plot the sampled sections to verify the areas.

The following illustration shows the relationship of M and N to the AutoCAD X and Y axes in the Average End Area grid lines:

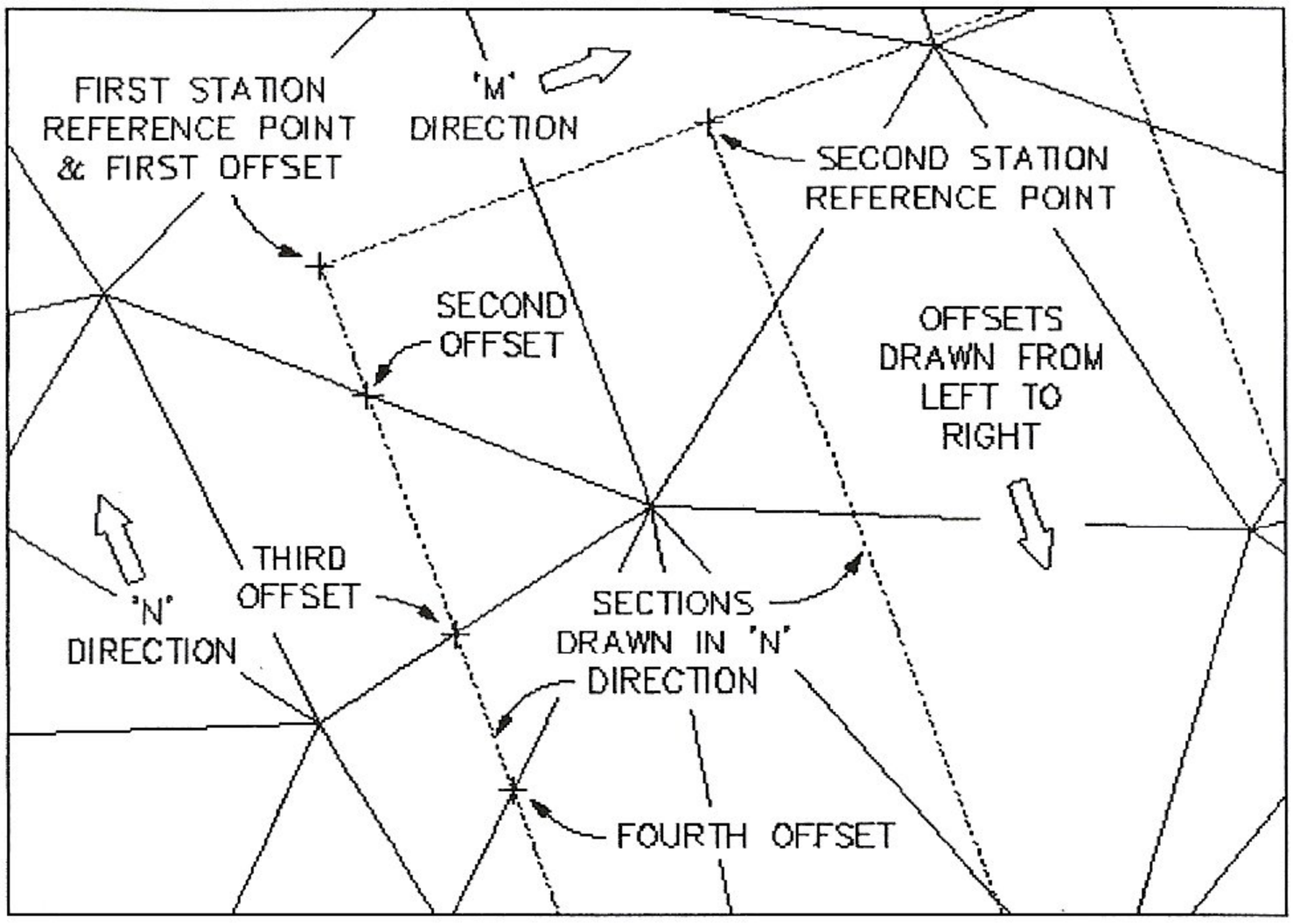



Average end area grid lines

The command defines each section line in the direction sampled to be a station. For example, if the grid is designed to use a cell width of 20 units, then each station is 20 units apart. The first section is always station 0+00 (0+000 in metric units). The fourth section would be assigned a station value of 0+60 (0+060 in metric units).

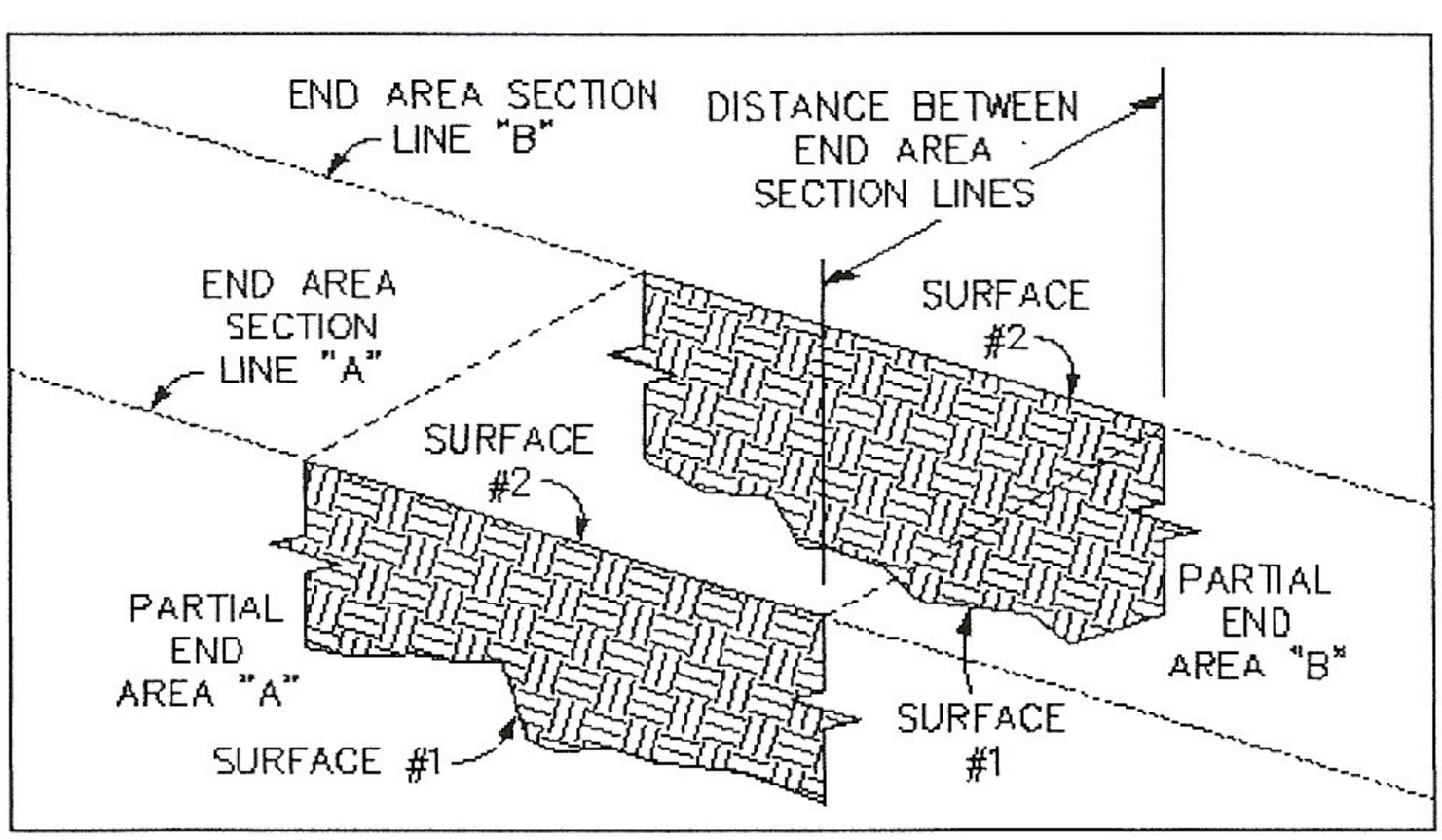
As each section is sampled, the command calculates the offset and elevation for each triangle edge that the section crosses on the surfaces. The offsets are always positive, and calculated from left to right along the section line in the direction of station progression. Each station (section) usually has several offsets and elevations.

The following illustration shows this relationship:




Relationship between stations, offsets, and elevations

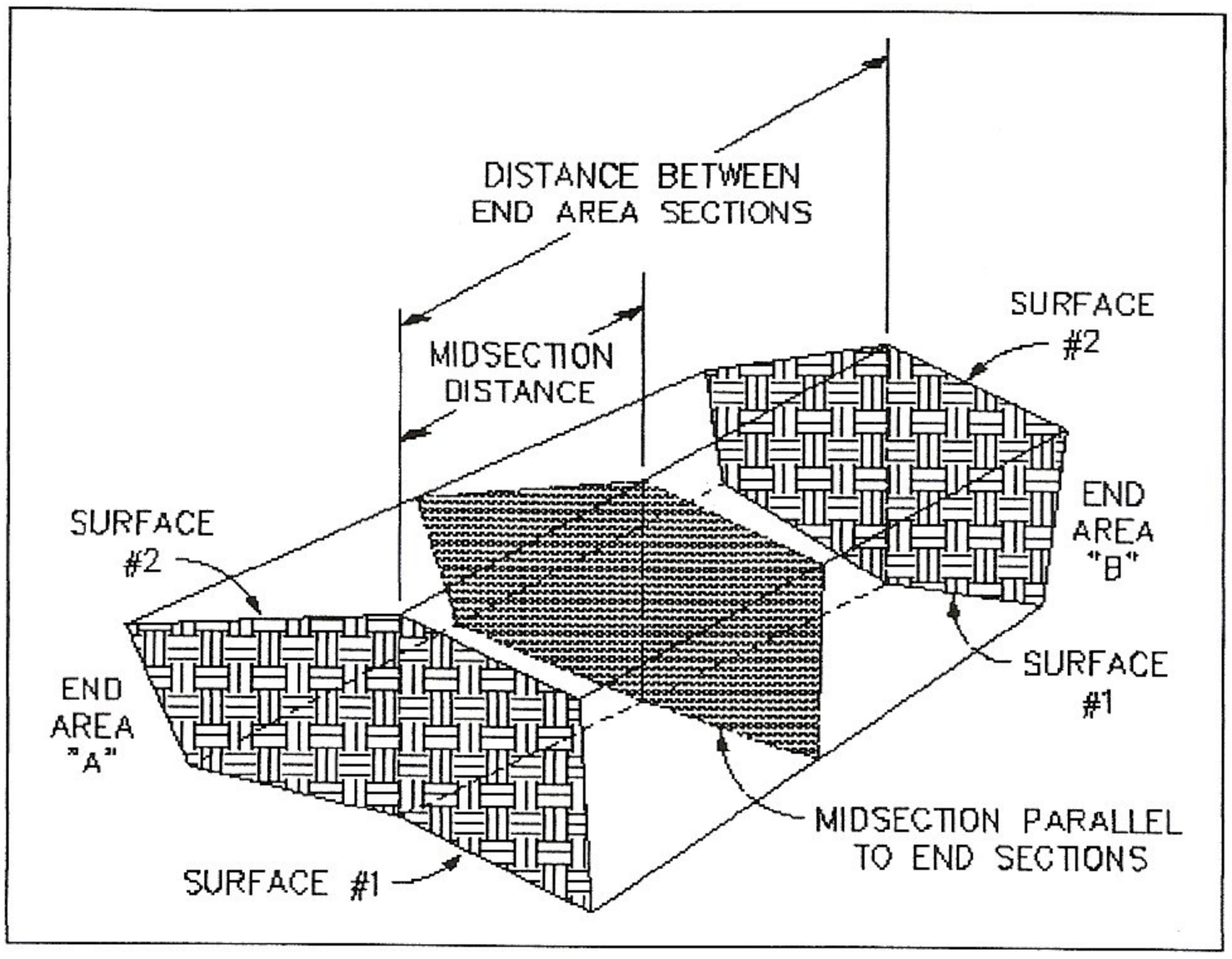
After the sections are sampled, the command uses either the Average End Area or Prismoidal method to calculate the volumes for the site. The following illustration shows the Average End Area method:




Average end area method

The Prismoidal method is similar to the Grid method. However, the Prismoidal method used for section volumes calculates the prismoidal objects between sections rather than between surfaces.

The following illustration shows the Section Prismoidal method:




Section prismoidal method