

Modeling Vertically-Staged Earthwork Overview of Available Modeling Tools

Vertically-staged earthwork refers to any form of intermediate grading (removal/replacement of unsuitable soils, temporary erosion control grading, placement/removal of surcharge loads, progress topos, structural excavation/backfill, etc.). If AGTEK uses the Existing (or Stripped) surface to represent the site's starting grade and the Design (or Subgrade) surface to represent final grade, how should an intermediate grade be modeled and quantified? AGTEK provides a wide range of tools and methods for this type of problem and the short answer is: *use the simplest method that meets your needs (and sometimes just scaling an average length and width from the plan sheet and manually calculating a volume based on an average depth is good enough!)*. But, if you want to use AGTEK, the available options include the following . . .

- ◆ A fixed-depth removal over an irregularly-shaped area can be quickly quantified by using AGTEK's **Length/Area** utility with an *Annotation Line* delineating the area (see page 198 in the *Day 1 Seminar Handbook*). Other options include entering a **Stripping Area** or a **Sectional Area** (use **File > Save As** to make a working copy of your AGTEK job file first); and similar results (but without using Stripping Areas or Sectional Areas) can also be obtained by using the techniques demonstrated on pages 65-67. The downside of all these options is that they produce a volume (and graphical documentation) based on a vertical cut face.
- ◆ To calculate volumes only between an intermediate grade and the Design or Subgrade surface, AGTEK's **Transfer Design/Subgrade** utility is quick and easy. This method accommodates varying grades and sloped perimeters but it removes all other surfaces from the starting file, limits volume calculations to the two surfaces remaining in the resulting finished file and does not produce the best-looking visual documentation (see page 82).
- ◆ More complicated methods stage the new intermediate surface into an original surface, retaining all original and new surfaces in one job file and producing the best-looking (staged) graphical documentation. The first of these methods that we look at uses a combination of AGTEK 4D's **New Surface** and **Stage Into** utilities (see page 87). AGTEK's **Apply Survey** (page 94), **Stage Over-Ex** (pages 101, 132-137, 155-165, 204-209), **Apply Template** (pages 118, 140), and **Lowest Surface** (pages 126-129, 140-143) utilities also include new surface and staging functions, as we'll see in those examples.
- ◆ Finally, the **Subtraction Method** for strata material undercuts is a bit labor-intensive (and results in two additional copies of the AGTEK job file), but the various data-manipulations involved are useful to know and they definitely deserve space in your AGTEK toolbox (see page 148).