



Since roadway excavation is measured by volume in cubic yards in its original position and computed by the method of average end areas, it is necessary to take cross sections or derive cross sections from a digital terrain model, both before and after the grading. Preconstruction cross sections are required, before the ground is disturbed, for all areas of the roadway where satisfactory preliminary or location survey cross sections have not been taken. Original cross sections or the cross sections taken before disturbance of the ground are to be determined at each predefined station interval and at intermediate points as necessary to show a true average of the original ground.

Occasionally, during the process of setting and marking slope stakes, a cross section will be found to be in error by 0.4 ft or more and not representative of the actual ground. In this event, the original ground line should be re-sectioned for accurate measurement of earthwork as well as for setting the slope stake. Remember to first check the accuracy of the staking procedure before doing any re-sectioning.

Each section will be taken on a line that is at right angles to the construction centerline (or base line or reference line), and should extend from the centerline to beyond the limits of construction on each side of the roadway. Each cross section will consist of taking and recording a measurement (and feature code, if applicable) on the ground at the roadway or construction centerline and at each significant break in the slope of the ground along the line of the section. The station and offset is recorded with the measurement. Readings should be taken in ditches and channels to establish existing drainage patterns and for future reference. If cross sections will be computed from a Digital Terrain Model (DTM) collected in the field, readings should be taken along break-lines (centerline, shoulder, ditch, etc.), at high points, at low points and at a predetermined grid interval, to best model the ground.

Upon completion of the grading, final cross sections or a DTM must be taken on the finished grade. A section will be taken at the pre-defined station interval and the same intermediate points on centerline, base line, or reference line at which the original sections were taken. Final sections will show the shape of the work by taking shots at the centerline and from the left and right sub-grade shoulder points to the outer lateral limits of the grading, or by collecting a DTM.

The use of aerial photogrammetry to obtain original and final cross sections from DTM may be used in place of ground surveys. In such cases, the only involvement of the survey crew may be to establish and mark the location and elevation of points on the ground for control of the photography.

Although software available may use DTM data to compute volumes between surfaces, the end area method is preferred due to the availability of data to verify results.

Unless other methods of measurement are used, areas of the roadbed undercut for removal of unsuitable material should be cross-sectioned before the back-fill is placed to show the quantity of material removed.