

OFFICE OF STATE AID ROAD CONSTRUCTION			S.O.P. NO. SA II-1-69
STANDARD OPERATING PROCEDURES			Page 1 of 3
Subject: S.O.P. SETTING GRADING STAKES, FINISHING STAKES AND PAVING STAKES			Distribution A, B, C, D, E
EFFECTIVE July 1, 2005	ISSUED July 1, 2005	SUPERSEDES Page 1 of 3 S.O.P. NO. SA II-1-69 EFFECTIVE: October 15, 2000	APPROVED J. Brooks Miller, Sr. STATE AID ENGINEER

PURPOSE: To Establish Uniform Procedures for Setting Grading, Finishing, and Paving Stakes.

1. GRADE STAKES:

In some instances, such as local road intersections, where site grading is indicated beyond the normal typical section, it may be necessary to provide the Contractor basic grade stakes indicating the cut or fill and offset from the shoulder line, and additional rough grading stakes in the area of the site grading.

These stakes will generally consist of standard flat stakes and will be set to rough line and grade; only to the accuracy commensurate with the intended use.

Cut or fill from the ground at the stake and offset (if any) to the point of grade should be marked on the stake.

2. FINISHING STAKES OR BLUE TOPS:

When the rough grading of the roadbed has been substantially completed, the County Engineer should set finishing stakes (blue tops) at centerline and shoulders of the roadway, at intervals of not more than 100 feet. Closer intervals may be needed because of sharp changes in grade or alignment, widening or superelevation. Finishing stakes are generally to be placed at the required locations, and driven so that the top of the stake is at the elevation of the finished grade of the pertinent earthwork. A good grade foreman and a competent motor patrol operator should be capable of finishing the grade to very nearly that required before calling for blue tops. If blue tops are called for and the grade is found to consistently vary more than ± 0.3 feet, the Contractor should be called back to provide closer grading prior to setting blue tops.

2.1. Finishing stakes are normally placed at the top of subbase and base courses. At times, in areas of critical drainage, staking must be provided to assure adequate slope. Ponding of water along embankments, in the roadway or in the ditches must not be permitted.

2.2. Finishing stakes are to be set accurately to line, solidly driven, and guarded by the Contractor. H.I.'s and grade rods are to be recorded to the nearest 0.01 foot, and the top of the stake driven to the elevation of the grade at that point.

OFFICE OF STATE AID ROAD CONSTRUCTION			S.O.P. NO. SA II-1-69
STANDARD OPERATING PROCEDURES			Page 2 of 3
Subject: S.O.P. SETTING GRADING STAKES, FINISHING STAKES AND PAVING STAKES			Distribution A, B, C, D, E
EFFECTIVE July 1, 2005	ISSUED July 1, 2005	SUPERSEDES Page 2 of 3 S.O.P. NO. SA II-1-69 EFFECTIVE: October 15, 2000	APPROVED J. Brooks Miller, Sr. STATE AID ENGINEER

3. PAVING STAKES:

Stakes for paving should be set with extreme care. The centerline control points must be reproduced to provide alignment for the pavement. Before establishing horizontal and vertical controls consult with the Contractor, if practicable, in order that the controls may be set at offset distances convenient to the Contractor's proposed operations. Usually these controls are set a minimum of two feet from the edge of the pavement.

- 3.1. There are several suitable methods of setting paving grade stakes. One of the most accurate methods is to drive a 2 x 2 inch hub flush with the surface of the ground and provide the cut or fill (usually fill) to the elevation of the normal pavement edge. To do this, centerline control points are offset, by use of a transit, at right angles to the centerline and to the offset distance agreed on with the Contractor, driving a hub flush with the ground and marking line with a transit tack. The offset tack line is then established at the required intervals for line and grade by actually running the line with a transit using the same deflections on curves as for centerline and using adjusted chord lengths. The line should be established with 2 x 2 inch hubs driven flush with the ground and a transit tack in each hub.

This offset tack line is to be used for control of pavement alignment, and for grade references on that side of the pavement.

- 3.2. After the offset tack line is established, a very convenient method of setting the offset grade line on the opposite side of the pavement is by the use of two tapes simultaneously; one measuring normal to the roadway from the tack point; the other measuring the computed diagonal distance from the tack point behind to the appropriate offset distance on the other tape. The 2 x 2 inch hub should be driven flush with the ground at the point thus established. It is to be noted that on tangents, of course, the diagonal distance measured should be a constant distance. For circular curves, the diagonal distance must be computed for each degree of curvature. For spiral curves it may be more convenient to use a transit to establish the offset grade point opposite the tack line points.

OFFICE OF STATE AID ROAD CONSTRUCTION			S.O.P. NO. SA II-1-69
STANDARD OPERATING PROCEDURES			Page 3 of 3
Subject: S.O.P. SETTING GRADING STAKES, FINISHING STAKES AND PAVING STAKES			Distribution A, B, C, D, E
EFFECTIVE July 1, 2005	ISSUED July 1, 2005	SUPERSEDES Page 3 of 3 S.O.P. NO. SA II-1-69 EFFECTIVE: October 15, 2000	APPROVED J. Brooks Miller, Sr. STATE AID ENGINEER

- 3.3. A desirable and accurate method of providing the Contractor with precise grade information is to turn through the project recording accurate level shots on all bench marks and all grade hubs at the same time, being sure that the respective shots right and left on the grade hubs are recorded in the field notebook. These notes can then be carried into the office and serve as a final line for check levels and, if found to be accurate, the cut or fill from the hub to the pavement edge elevation may be computed and recorded in the field notebook adjacent to the rod reading.

It is then a simple matter for one man to go to the field and mark on the face side of the guard stakes the cut or fill to grade, and on the back side of the guard stakes the station number. A copy should be furnished the Contractor for his use in the event a guard stake is destroyed or a question arises as to the proper reference marks on a stake.

As stated above, there are other accurate methods of providing line and grade. However, driving stakes such that the top of the stake is at the elevation of the paving grade is not desirable because of the susceptibility of such stakes to being struck by equipment or posing a hazard to personnel, and in the case of projects, where traffic is required to be maintained, a hazard to traffic.

Unless planned equipment and proposed Contractor's operations would justify otherwise, all paving stakes for high type pavements should be set at 25 foot intervals. All grades for pavements are to be provided to the nearest 0.01 foot.