

## IMPROVED HARVESTING METHODS

### EQUIPMENT SURVEY NOTES

#### IMPROVED ALINEMENT OF LOGGING ROADS REDUCES HAULING COSTS

Examination of hauling equipment on many logging jobs indicates that more attention should be given to logging roads. This observation leads to a suggested simplified method of laying out logging roads to reduce excessive wear on trucks and to increase operating speeds. Good alinement also demands a minimum of mental and physical effort from vehicle operators, and it thereby increases their efficiency. Recent studies in the West show that round-trip time required on level dirt roads with poor alinement is nearly 50 percent greater than the time required on similar roads with good alinement.<sup>1</sup>

Crooked roads require truck drivers to be under constant mental strain. In addition, the continuous maneuvering of loaded trucks requires considerable physical effort. These combined requirements cause fatigue that reduces alertness and muscular response of drivers, and thereby increases the chances of costly accidents.

Another factor contributing to accidents is the deterioration of trucks. Steering and brake mechanisms are subject to more wear on crooked than on straight roads, and they therefore require frequent inspection and adjustment. Heavy loads going around curves induce a centrifugal force that results in a strain on vehicles. When this force is constantly shifting from side to side, premature failure of individual vehicle parts often results.

All of these factors contribute to the cost of transporting forest products from the woods to the processing plant. Straighter logging roads, particularly in the eastern regions, can reduce logging costs.

Too often logging roads are built by bulldozer operators whose only instructions are the location of each end. Unanticipated obstructions cause changes in direction. The resulting road has kinks and turns that are difficult to travel (fig. 1).

Advance designation of the location by stakes and blazes will improve alinement (fig. 2). Laying out straightaways is no problem, but the average logger considers laying out uniform curves a difficult job requiring complicated tables or surveying instruments. There is a simple, easy, low-cost method of laying out uniform curves that requires only a tape, a measuring stick, a good eye, and a little care.

<sup>1</sup>"Cost of Hauling Logs by Motor Truck and Trailer," by J. J. Byrne, R. J. Nelson, and P. H. Googins, Pacific Northwest Forest Experiment Station, Portland, Oreg. 1947.





Figure 1.--Poor alinement on nearly level ground. A single flat curve could easily have been built. On some roads kinks of this kind have been observed where the road could have been straight.



Figure 2.--Good alinement on a logging road in the same type of timber and terrain.

A stake is first set at the beginning of curvature (end of the straightway) point A, figure 3. Then decide about how far apart stakes are needed on the curve. They should be closer together on sharp curves than on flat curves. Distances from 25 to 100 feet are suitable for logging roads. Measure the selected distance from A to C in line with B. Then at right angles to C set a stake at D and mark the distance CD on a measuring stick. Lay off the same distance from D to E and stretch the tape from A to E the same distance as from A to C and set a temporary stake at E. Then double the selected distance to F in line with stakes A and E and set stake F. Pull up the temporary stake E and set it at G by using the measuring stick and tape in the same way as at E. Then set stake H in the same manner as that by which F was located.

This procedure is repeated around the curve. As long as all measurements are the same each time, the curve will be smooth. If it does not end at the right place for the next straightaway, either increase or decrease the length marked on the measuring stick and reset the stakes. With a little practice the proper curve can be laid out on the second try.

By using a distance of 25 feet between A and C, the distance CD should not be more than 4 feet for small trucks or 2 feet for trucks and trailers hauling 16-foot logs. A shorter distance will always make a better curve and increase hauling efficiency.

The method outlined above is a standard engineering procedure known as the middle-ordinate method. It can be used by a logger or inexperienced engineer as outlined in this note. Tables are also available for use by experienced road locators by which curves of predetermined radii can be accurately staked out.

Other methods requiring more skill, equipment, and technical knowledge can be used, and they may be justified when large volumes of timber are to be hauled.

E. W. Fobes

June 1950

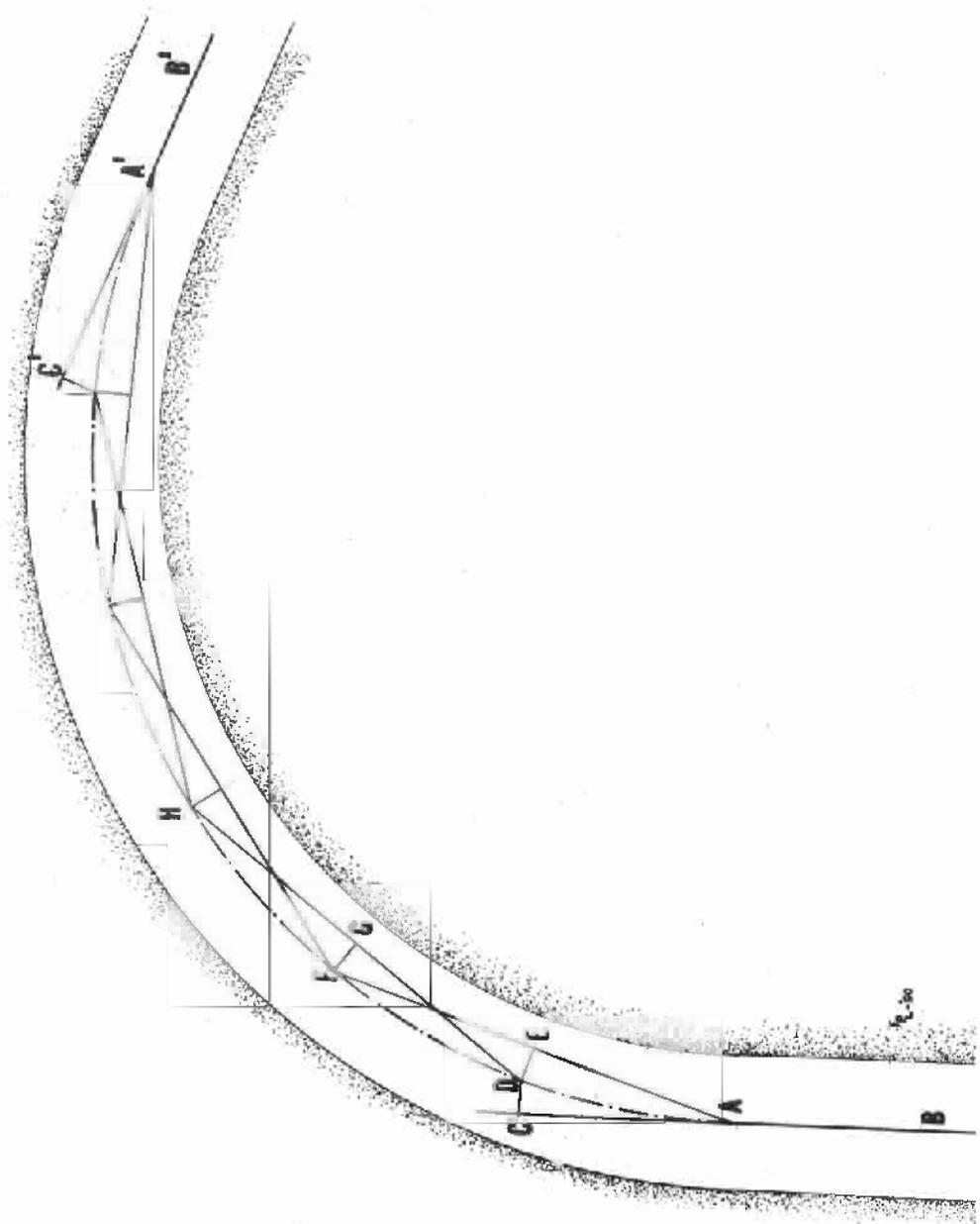


Figure 3.--Diagram of procedure for staking out a curve on a logging road. Only a measuring stick and tape are required.