DESIGN FOR HORIZONTAL CONTROL POINTS

If the designer has determined that the most significant control problems over a particular design zone are those of the horizontal design, the process moves down the right side of the ROAD DESIGN FLOW DIAGRAM. Many of the design considerations are exactly the same. The major differences are in the order that the design processes are carried out.

I. On the plan, prepare a series of tangents that provide a satisfactory routing through or around the existing horizontal control points. These tangents need not connect existing "P" line points of intersection. Most inexperienced designers are reluctant to deviate too far from the "P" line. You are encouraged to locate new PI points anywhere along the design where they will provide you with a well engineered alignment with respect to the control points. New PI's can be picked at convenient points on the plan. The coordinates of these points can then be determined by scaling or by picking their coordinates off of the grid paper.

Using a radius guide, circle template, or compass, connect the tangents with curves that satisfy the design specifications. Consider sight distances, etc. The tangents and curves make up the trial "L" line.

II. Scale the "L" line to the "P" line cross sections to determine the "L" line stationing. Record this information on the ROAD DESIGN FORM. See items A and D on the form.

III. Scale from the "P" line to the "L" line on each section to determine the TRIAL OFFSET, item C on the example form.

IV. Plot the offset information on the cross section. Mark the "L" line centerline.

V. Determine and record the "L" line ground line elevation. This elevation should be determined at the centerline. See item F on the form.

VI. Place the roadway template on the cross section and slide it vertically until the cut and fill areas are approximately equal considering shrinkage and swelling of the material, turnouts, curve widening, slough widening and drainage. Record the elevation of the centerline under the heading of TRIAL GRADE ELEVATION.

VII. Referring to the ROAD DESIGN FORM, use the "L" line stationing and the "L" line groundline elevation plot the "L" line ground line profile. Using the same stationing, plot the "L" line TRIAL GRADE ELEVATION. Use tic marks to denote the TRIAL GRAD ELEVATION at each station.

VIII. Draw vertical alignment tangents through the tic marks wherever possible. Connect these tangents with appropriate vertical curves that pass through as many tic marks as possible. By this method, prepare a vertical alignment that satisfies the design criteria. Remember to take into consideration all of the previous discussion on vertical alignments.

IX. Where there are significant differences between the TRIAL GRADE ELEVATIONS and the designed grade, return to the cross sections. Study the cross sections to ensure that the change in centerline elevation does not change the cut or fill slopes in such a way that the horizontal design is

unsatisfactory. Also, ensure that the slopes of the sections will catch in a manner appropriate for the control points.

X. If necessary, consider either horizontal alignment or vertical alignment adjustment to alter the side slope catch point locations in order to avoid horizontal and/or vertical control points. Again, with experience the designer will be able to make these adjustments with one iteration of the process.

XI. When both the horizontal and vertical alignments have been adjusted to satisfy the design criteria and to properly deal with the control points, preliminary earthwork computations can be completed and a trial mass diagram plotted. These topics are covered in the next section.