1. Determine design moment and torsion, and the required drilled shaft diameter as outlined in the selection guide sheet COSS-DE.

2. Make an initial estimate of the required embedment length.

3. From soil exploration data determine type of soil and average N value or soil property along the upper third of the drilled shaft.

4. Enter chart for the correct shaft diameter and soil type from Fig. 1.

5. Proceed vertically into chart from upper N value determined in step 3.

6. From intersection point turn 90° to left and read embedment length along vertical scale.

7. If embedment length differs significantly from estimated value return to step 3 with the embedment length determined in step 6.

8. From soil exploration data determine type of soil and average N value or soil property along the lower third of the drilled shaft.

9. Proceed vertically into chart from lower N value determined in step 7.

10. Proceed vertically into chart and locate intersection with design torsion. Interpolate between torsion curves located along the intersection point turn 90° to left and read embedment length along vertical scale.

11. Compute the required length of drilled shaft by adding 3'-0" to embedment length required for moment or torsion.

**Detached Shaft Designs**

- These charts are for use with column and foundation sign supports with one shaft per tower. Solid curves are base moment inkip-f. Each curve is base torsion inkip-f. Minimum embedment of drilled shaft is 2 diameters. Add 5'-0" to the required embedment length to determine the required length of drilled shaft.