

Dynamic Cone Penetrometer (DCP) Testing

The DCP test provides a measure of in-situ resistance to penetration.

The test is conducted by driving a metal cone into the ground by repeated striking it with a dual-mass (17.6 lb/8 kg) or single-mass (10.1 lb/4.6 kg) weight dropped from a height of 23 in. (575 mm)

ASTM D6951 test protocol is followed.



Steps:

- Step 1** • Hold the penetration rod vertical; make sure the reading scale is clear; note the initial reading.
- Step 2** • Raise the hammer up to the top of the sliding bar. Let it fall freely; make sure your finger is not at the point of fall.
- Step 3** • Record the penetration reading.
- Step 4** • Repeat Steps 1 to 3 until you get a consistent penetration per blow.
- Step 5** • Repeat Steps 1 to 4 for nearby other points (at least 1 ft away)
- Step 6** • Calculate the average penetration per blow.
- Step 7** • If you used the single-mass DCP, convert your single-mass DCP value to dual-mass by using $\text{Dual-Mass DCP} = 1.61 \times \text{Single-Mass DCP}$.
- Step 8** • If you used the dual-mass DCP, then, the DCP value as is.
- Step 9** • Calculate the R-value using, $R = 330.66(\text{DCP})^{-0.924}$, where DCP is dual-mass DCP value in mm/blow.

Example 1: Single-Mass DCP

Say, one conducted single-mass DCP test on a site. The average single-mass DCP value is measured to be 6.5 mm per blow. Then, the dual-mass DCP value is $1.61 \times 6.5 = 10.5$ mm per blow. The R-value will be $330.66(10.5)^{-0.924} = 38$.

Example 2: Dual-Mass DCP

say, one conducted dual-mass DCP test on a site. The average dual-mass DCP value is measured to be 8.5 mm per blow. Then, the R-value will be $330.66(8.5)^{-0.924} = 46$.