

Inexpensive Access Tube Installation of Tensiometers Below a Flowing Stream

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A method for installing ceramic porous cup tensiometers in a rocky streambed without augering was devised in an effort to determine the hydraulic gradient below a flowing, perched stream. The access tubes are tailored to the lengths of the tensiometers, and hardened steel sacrificial well tips enable the emplacement of the access tubes in typical rocky channel alluvium to depths well over 3 feet (1 m).

Figure 1 illustrates the construction and emplacement of the access tube system. The objective is to bring the ceramic cup of the tensiometer into hydraulic contact with the soils under a flowing stream or in any substrate too

rocky to auger a suitable installation hole. The body of the access tube consists of 1-inch (2.54-cm) EMT steel conduit (available in hardware stores). This material is readily cut by a ban saw or hacksaw. Each access tube is cut to permit just the length of the porous cup to extend beyond the bottom end of the steel tube while simultaneously allowing the glass window of the tensiometer to protrude above the top of the steel tube.

Using a hardened steel sacrificial well tip machined to fit (but still be held) loosely in the end of the steel tube, and with a hardened steel hammer cap placed in the top end of the steel tube (Figure 1a), the access tube is driven by a sledge or slide hammer to the

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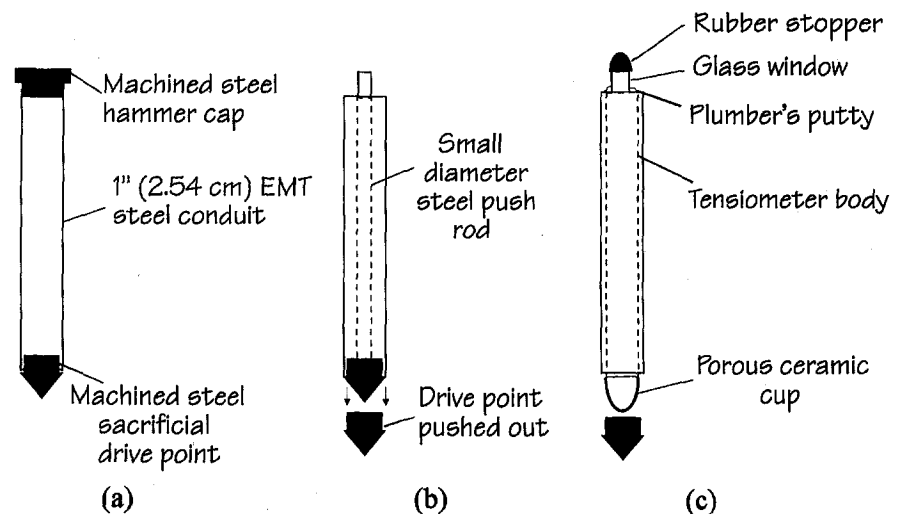


Figure 1. Schematic diagram of tensiometer steel access tube system.

desired depth. Next, the hammer cap is removed, and a slender steel rod (e.g., a piece of 0.5-inch [1.2-cm] EMT conduit) is inserted into the access tube and subsequently hammered to drive the well tip just 2 to 3 inches (5 to 7.5 cm) out of the bottom of the access tube (Figure 1b). At this point, a prepared tensiometer should be inserted into the access tube so that the porous cup comes to rest in contact with the soil just below the end of the access tube and above the sacrificed well tip. For best results, a small amount of slurry of native soil and native water should be poured down the access tube prior to emplacing the tensiometer to ensure good contact between the soil and the porous cup.

With a proper fit, the glass window of the tensiometer should be visible above the top of the access tube (Figure 1c). After filling the tensiometer with (deaired) water and capping it, the gap between the tensiometer body and the access tube should be sealed with plumbers putty to prevent evaporation from around the cup or downward leakage from rainfall or stream water overflow. As with any tensiometer application, early measurements should reflect a period of equilibration before accurate pressures are recorded.

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