

## CONES FOR MEASURING SOIL CREEP

M. J. Selby\*

### ABSTRACT

A simple and cheap device for measuring soil creep and other mass movements is described. An aluminium cone of 60 mm diameter with a wire attached can be buried in the soil and used to record movements in the soil profile when the wire is measured against a fixed point. A number of cones can be used to give a velocity profile.

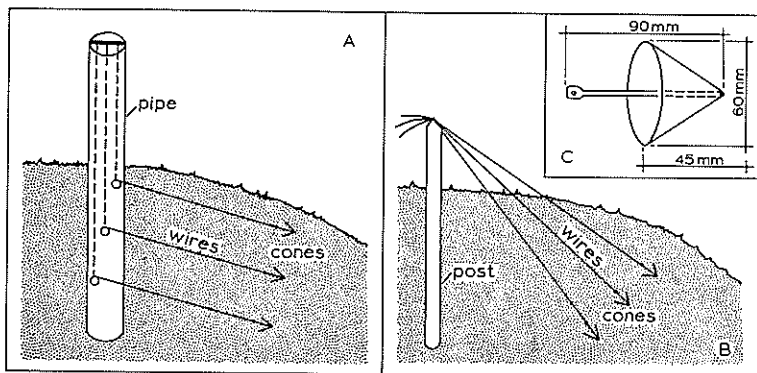


FIG. 1 — (A) Creep cones in place with wires leading into a pipe.  
(B) Cones in place with wires leading to a survey post.  
(C) Dimensions of a creep cone.

A number of devices for measuring soil creep have already been described (Selby, 1966). They have the disadvantage that they are either expensive, or easily disturbed, or do not give a velocity profile. Preliminary studies suggest that a cone buried in the soil and attached by a wire to a survey point is effective in overcoming these disadvantages.

The cone is made of sheet aluminium of 1.7 mm thickness (Fig. 1C). Aluminium rod of 3.5 mm diameter is welded inside the apex of the cone and the protruding end of the rod is flattened and punched to take piano wire of 1 mm diameter.

\* University of Waikato.

Installation of the cones is simple but time consuming. A narrow pit is dug normal to the slope and small depressions pushed into its downslope wall to take the cones. The cones can then be held in position by a rod or ruler while the pit is being filled. Care should be taken to compact the soil to the same extent as that surrounding the pit, and to prevent the wires being bent. The wires can be led either directly to the top of a survey post or into a vertical pipe, the holes through which are prevented from damaging the wire by being filed smooth or edged with copper sheet crimped on to the pipe (Fig. 1A, B). The wires should be numbered by fixing plastic or metal tags to them and the buried cones should also have the serial number engraved on them. The survey post or pipe should be on a stable area and either embedded in bedrock or sunk deeply into an interfluvium. In either case the exact location should be fixed by survey and the angle of inclination of the pipe recorded. Alternatively, a nail head sunk into exposed rock may be used as a reference point.

It is suggested that any other instruments used in the study, such as thermistors or moisture blocks, be buried in a hole adjacent to that with the cones, so that if one set of instruments has to be removed then the others need not be disturbed. Readings can be taken by stretching the wire across the survey point at a fixed tension, and for this purpose it is convenient to use a spring balance. Direct readings can be taken if a length of survey tape is attached to a loop in the piano wire — any displacement of the cones is then immediately obvious.

Preliminary results suggest that the method described has many advantages for measuring soil movements as it can either be read manually, or — if the cones are embedded in a flow — automatically when the piano wire is attached to a recorder. In areas subject to disturbance by man or animals the wires can either be enclosed in the vertical pipe (Fig. 1A) or placed in a container at the ground surface.

A number of methods of measuring mass movement have now been devised. Each method produces results which are not comparable with those produced by different methods, and it is hoped that one of those now available will be used as a standard.

#### ACKNOWLEDGMENT

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#### REFERENCE

- Selby, M. J. 1966: Methods of measuring soil creep. *J. Hydrol. (N.Z.)* 5 (2): 54-63.