Working Copy

WP 07-EU1305

Revision 2

Installing Multiposition Borehole Rod Extensometers

Technical Procedure

EFFECTIVE DATE: 09/01/05

John VandeKraats
APPROVED FOR USE

Working Copy

TABLE OF CONTENTS

INTRODUCTION 3

REFERENCES 3

EQUIPMENT 3

PREREQUISITE ACTIONS 4

PERFORMANCE 4
1.0 INSTALLING MULTIPOSITION BOREHOLE ROD EXTENSOMETERS 4

INTRODUCTION

This procedure details the steps necessary to install multi-position borehole extensometers in boreholes. This work does not include drilling the borehole, borehole checkout, or the additional wiring required to connect the extensometers to the data logger system.

The record produced by the use of this procedure is the GIS Initial Data Sheet (Attachment 1 of WP 07-EU1303). Completed data sheets are maintained in accordance with the Geotechnical Engineering Records Inventory and Disposition Schedule.

REFERENCES

BASELINE DOCUMENTS

- WP 07-1, WIPP Geotechnical Engineering Program Plan

REFERENCED DOCUMENTS

- WP 07-EU1303, Geomechanical Instrument Data Processing.

EQUIPMENT

- Extensometer reference head assembly
- Borehole anchors
- 1/4 inch connecting rods (quantity varies with depth of borehole anchor)
- 1/2 inch protective nylon anchor rod tubing
- Male and female disconnect fittings (one each per borehole anchor)
- Hose clamp for 1/2 inch hose
- Numbered extension rods
- Setting rods with bar stop
- Small diameter pulling cable
- Tools - including two 4- or 6-inch Vise Grip pliers, extended Allen wrench set, knife (razor blades), screwdriver, and tape measure
- Nut-locking adhesive (Locktite)
- Marking pens or spray paint

Working Copy

- Lubricating grease
- Adhesive tape

PREREQUISITE ACTIONS

1.0 Verify borehole diameter and depth is in accordance with planned installation.

2.0 A designated competent person shall examine work areas for unsafe conditions at the beginning of each shift and periodically during the shift. Any unsafe conditions or practices found shall be corrected before any further work is performed in that work area.

PERFORMANCE

1.0 INSTALLING MULTIPOSITION BOREHOLE ROD EXTENSOMETERS

1.1 Lay out the anchor rods and setting rods required to position the deepest anchor at its required depth. Anchor depths are calculated from the center of the borehole anchor to a position one inch below the surface anchor reference plate.

1.2 Determine the number and lengths of 1/4-inch diameter anchor rods.

1.3 Attach the measuring rods into the appropriate holes on the anchors, e.g., if there are four anchors, use hole #4 for the fourth anchor.

NOTE

Each anchor is usually supplied preassembled with the fitting in the appropriate hole.

1.4 Use a nut-locking adhesive (Locktite) to tighten the fittings and ensure secure mounting.

1.5 Slide the protective nylon anchor rod tubing over the female fitting on the deepest anchor.

1.6 Secure the tubing with 1/2-inch hose clamps.

1.7 Verify that the hose clamps do not interfere with the measuring rod.

1.8 Repeat Steps 1.1 through 1.7 for the subsequent anchors.

1.9 Mount the deepest anchor onto the setting rods.

1.10 Check that the anchor easily slides off the setting head.

1.11 Hook or crimp the pulling cable to the anchor setting pin.

Working Copy

1.12 Push the anchor with the setting rod to the planned anchor depth.

NOTE

The orientation of the anchors must be maintained as the anchors are pushed into the borehole to avoid contact and/or crossover of the measuring rods in the borehole.

1.13 Holding the setting rod firmly, pull out the anchor setting pin.

1.14 Remove the setting tool from the borehole.

1.15 Repeat Steps 1.9 through 1.14 for the subsequent anchors with the installed nylon tubing threaded through the appropriate hole in each anchor.

1.16 Mount the reference head anchor assembly onto the setting rods.

1.17 Check that the anchor easily slides off the setting head.

1.18 Hook or crimp the pulling cable to the anchor setting pin.

1.19 Work the protective tubes through their respective guide tubes in the surface reference head anchor assembly.

1.20 Insert the reference head anchor assembly into the borehole until the reference plate is at the selected elevation.

1.21 Holding the setting rods firmly, pull out the anchor setting pin.

1.22 Remove the setting tools from the borehole.

NOTE

The nylon anchor tubing should be flush with or retract slightly into the reference head anchor.

1.23 Cut the nylon tubing for each anchor at the face of the surface anchor by pulling each tube until it is taut and then cutting it with a knife.

1.24 Remove the extension rods.

1.25 Install the transducer(s) and take an initial reading with the portable reading device.

1.26 Record the data on GIS Initial Data Sheet, WP 07-EU1303, Attachment 1.