TEXAS TECH UNIVERSITY
Multidisciplinary Research in Transportation

Non-destructive Testing of Installed Soil Nails Using Sonic Echo Test Method

Test Procedure Manual

Research Project Number: 0-4484
Research Product Number: 0-4484-P1

Yajai Tinkey and Priyantha Jayawickrama

Performed in Cooperation with the Texas Department of Transportation
and the Federal Highway Administration

Center for Multidisciplinary Research in Transportation

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A. TEST INSTRUMENTS

The instruments and materials needed to perform this test procedure include the following:

1. A data acquisition system (a Freedom Data PC) with Sonic Echo add-on amplifier (See Figure 1)
2. A 0.2 lbs instrumented hammer with metal and plastic tips (See Figure 2)
3. Three coaxial cables
4. Two accelerometers with magnetic base with frequency range between 1.0 to 10,000 Hz. with a minimum sensitivity of nominally 100 mV/g (See Figure 3)
5. Magnetic washers with a diameter of 0.5 inch
6. 5 minute (quick set) epoxy or similar adhesive

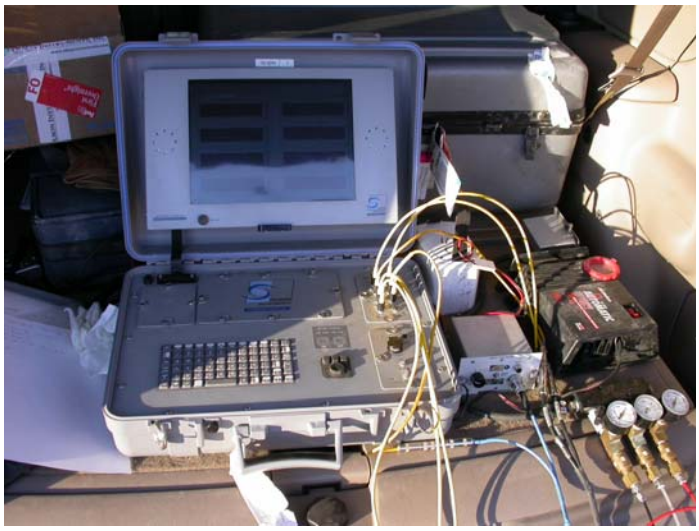

Figure 1 Freedom Data PC Used Sonic Echo Testing

Figure 2 Instrumented Hammer with Interchangeable Metal/Plastic Tips

B. TEST PROCEDURE

Sonic Echo Test Setup for Condition Assessment of Installed Soil Nails

STEP 1: Mount the magnetic based washer onto the grout on the front surface of soil nail using quick set. The mounted area on the grout must be relatively flat and cleaned so that the washer can attach to the grout well. The washer must be left on the installed soil nails for at least 0.5 hour before testing (See Figure 3)

STEP 2: Connect the instrumented hammer and accelerometers to the data acquisition system using coaxial cables.

STEP 3: Attach the magnetic based accelerometer to the installed washers on the grout.

STEP 4: Acquire the Sonic Echo data by striking the grout with the 0.2 lb instrumented hammer with metal tip. Use at least 3 impacts. (See Figure 4)

STEP 5: Acquire the Sonic Echo data using the 0.2 lb instrumented hammer with plastic tip (at least 3 impacts) (See Figure 4). Figure 5 presents typical results from Sonic Echo Test.

Figure 3 Accelerometer Attached to Washer on the Grout

Figure 4 Hitting the Grout Column Head with 0.2-lb Hammer

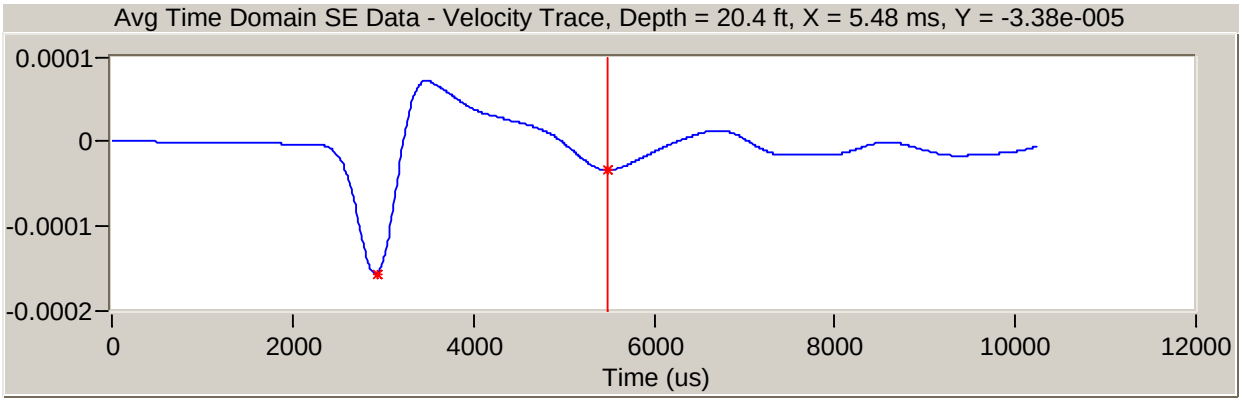

Figure 5 Typical Results Obtained from the Sonic Echo Test