

## SAMPLE SPECIFICATION for BLOW COUNTING DEVICE

### with optional depth and kinetic energy measuring accessories

June 2011

The Contractor shall provide an “**Energy Saximeter (E-Sax)**” or equivalent for each piling project where piles will be driven and blow counts will be recorded. The E-Sax or equivalent shall document the installation process of each pile to assure that the pile driving criterion is met. At the end of each day of pile driving, all records shall be downloaded to a computer and sent to the Project Inspector and/or Engineer for further review and permanent storage. The E-Sax (manufactured by Pile Dynamics, Inc., 30725 Aurora Road, Cleveland, OH 44139, USA; <http://piledynamics.wpengine.com/>; email: sales@pile.com; phone: +1 216-831-6131; fax +1 216-831-0916,) or equivalent shall meet the following minimum specifications:

- 1) The **E-Sax** or equivalent shall be a small hand held device. It shall numerically display all information gathered by a blow detection system (built-in microphone or optional proximity switches). If the optional accessories listed in items 3 and 4 are required the device shall have an internal transceiver with frequency between 2.4 and 2.5 GHz. The device shall have an easy-to-read digital screen clearly readable in daylight, and display four lines of text and 16 characters per line. The device shall display acquired data in real time, and shall store data electronically for transmission and permanent storage. The E-Sax or equivalent shall have a minimum of 8 MB of memory, equivalent to 21,500 lines of data, available for storage and download at a later time. Blow count per unit of penetration shall be obtained by the operator pressing a key for each unit penetration, or with optional depth sensor. Battery life shall be at least 16 hours.
- 2) **Results to be obtained include:** pile name, date with start/stop times of all pile driving, blows per minute (BPM), stroke (for open end diesel hammers only), blow count versus depth (in blows per foot or blows per 0.25 meter), and final equivalent blow count for the last 20 blows. If optional proximity switches listed in item 4 are specified results shall also include kinetic energy and impact velocity.
- 3) **Depth Sensor with transmitter:** This \_\_\_\_\_ (select one: required, optional) subsystem shall measure the pile depth of penetration, and (combined with the blow detection function) shall allow a fully automatic collection of blow count per unit penetration versus depth. The depth sensor shall be supplied and installed by the contractor on the hammer leads according to the manufacturer’s specifications or in collaboration with the manufacturer, and shall track the movement of the hammer via a cable attached to the hammer. The displacement sensor shall have a resolution of 0.6 mm (0.02 in) and a maximum range of 49 m (161 ft). A wireless transmitter shall send the current depth of penetration data to the E-Sax or equivalent at all times during the installation process. If depth sensors are not specified then pile penetration information shall be entered manually by the E-Sax operator with the push of a button at each depth increment.
- 4) **Proximity switches with transmitter:** This \_\_\_\_\_ (select one: required, optional) subsystem shall detect hammer blows and shall measure the ram velocity at impact, and hence kinetic energy. The system shall consist of two proximity switches installed on the diesel, hydraulic or air hammer to be monitored. The switches shall be supplied and installed by the contractor on the hammer according to manufacturer’s specifications or in collaboration with the manufacturer, and shall send data via a wireless transmitter to the hand held device. If proximity switches are not specified, the E-Sax or equivalent shall detect blows using the built-in microphone.

5) **Transmitters:** When items 3 and/or 4 are required the associated wireless transmitters shall have 8-hour rechargeable battery packs that are removable from the hammer at the end of each day for recharging, or can be recharged from the crane battery. Transmission range shall exceed 100 m (328 ft). The E-Sax (and depth sensor and/or proximity switches, if specified) shall be installed prior to installation of the piles, and shall be maintained during the installation of all production piles unless otherwise directed by the Project Inspector and/or Engineer. In the event that the unit is not fully operative, the Contractor shall notify and work with the manufacturer to rectify the situation. In the interim, the Inspector shall manually record blow counts, start/stop times, and blows per foot as directed by the Project Engineer.