PREPARING FOR BOREHOLE DILATOMETER TESTING

The following document is intended to provide guidance to drillers and project managers. It is based on experience and manufacturer recommendations. Project situations are variable, and the information included herein is not all encompassing. We recommend a conversation take place between Mapes In-Situ and all applicable project team members prior to field work.

General Requirements

Applications	The PROBEX[e] borehole dilatometer can be used in soft to hard rocks. Generally, the rock should be hard enough to core successfully without washing out. If the rock is very soft, a soil pressuremeter such as the TEXAM[e] may be a better option.
Acceptable Drilling Methods	In general, the rock to be tested should be cored with N-sized (76 mm) core tooling. In some soft rock situations, a tri-cone roller bit with rotary drilling may be used to reduce the potential for oversized boreholes. Further details and diagrams on acceptable and unacceptable drilling methods and procedures are included in this document.
Test Pocket Diameter	The portion of rock to be tested must be as close as possible to 76 mm in diameter. Oversized boreholes significantly limit testing procedures and useable data. **Oversized core bits/reaming shells often used with air coring systems may be too large. Please confirm core bit/reaming shell diameter is not more than 76 mm.**
Drill Rig and Tooling Requirements	• Breakout table / rod clamping system to safely make connections of the probe assembly during insertion • NQ core steel or BW casing for *Method A* described below • HQ or PQ core steel, or similar larger casing/hollow stem augers for *Method B* described below • AW or AWJ drill rods for Method B described below • AW, AWJ or NWJ winchline hoisting plug for hoisting probe assembly
Additional Notes	• It takes about 2 hours to set up, calibrate the PROBEX[e], and begin the process of probe assembly insertion. • Thought should be given to the timing of hole completion vs. testing schedule if using *Method A*. There are many contributing factors, but it often makes sense to finish coring early to mid-morning, with testing to begin late morning and continue for the remainder of the day. • Testing can be very rapid if using *Method A*. 10+ tests in a borehole in a day is very realistic. • In softer rocks, testing should be performed as soon as possible after coring. • Probe assembly may **not** be lowered into borehole on a wireline. It will twist under tension and cut hydraulic and communication lines. Rods or core steel/casing must be used.

Method A – Continuous N-Sized Core

This method is the most preferrable and efficient process to perform borehole dilatometer testing. The entire borehole is completed with N-sized (75.7mm) core tooling to the maximum depth of exploration. The probe assembly is then lowered down the hole as an extension of the core tooling system with either NQ core steel or BW casing attached to the probe, with the hydraulic and communication lines inside of the core steel to protect them. This creates a flush system that is fully protected from protruding rock ledges or cave-ins. The picture below shows the process of probe insertion using a slotted sub along with NQ core steel:

Slotted sub allows the lowering of probe assembly with hydraulic and communication lines protected within core steel/casing.

A breakout table/casing clamping system is required to safely hold the probe assembly while each section is added and lowered downhole.

Hydraulic and communication lines are fed through enough core steel/casing to reach deepest test depth. Probe assembly is then lowered to deepest test depth one piece of casing at a time, where testing will then begin.

Enough core steel/casing is required to either a) reach the surface of the borehole, or b) reach an elevation that is within a larger casing system or hollow-stem augers. *At no point should the top of the probe or attached core steel, or the hydraulic and communication lines be exposed to the unprotected sidewalls of the boring.*

The slotted sub threads are: N (pin) or BW (pin) to attach to core steel or casing, and AW (box) or AWJ (box) to attach to winch line or drill rods.

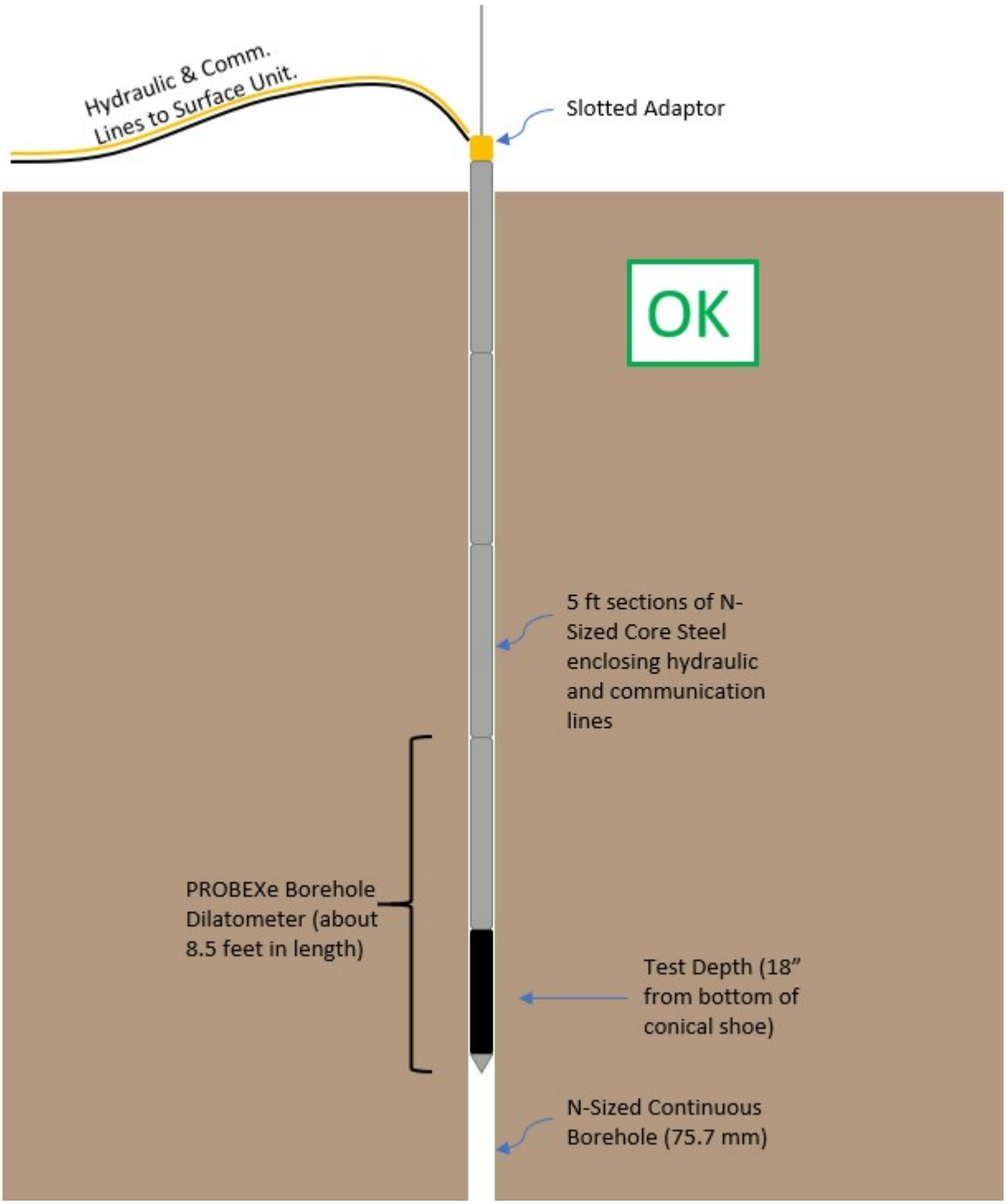
Method B: H or P-Sized Core with N-Sized Test Pocket

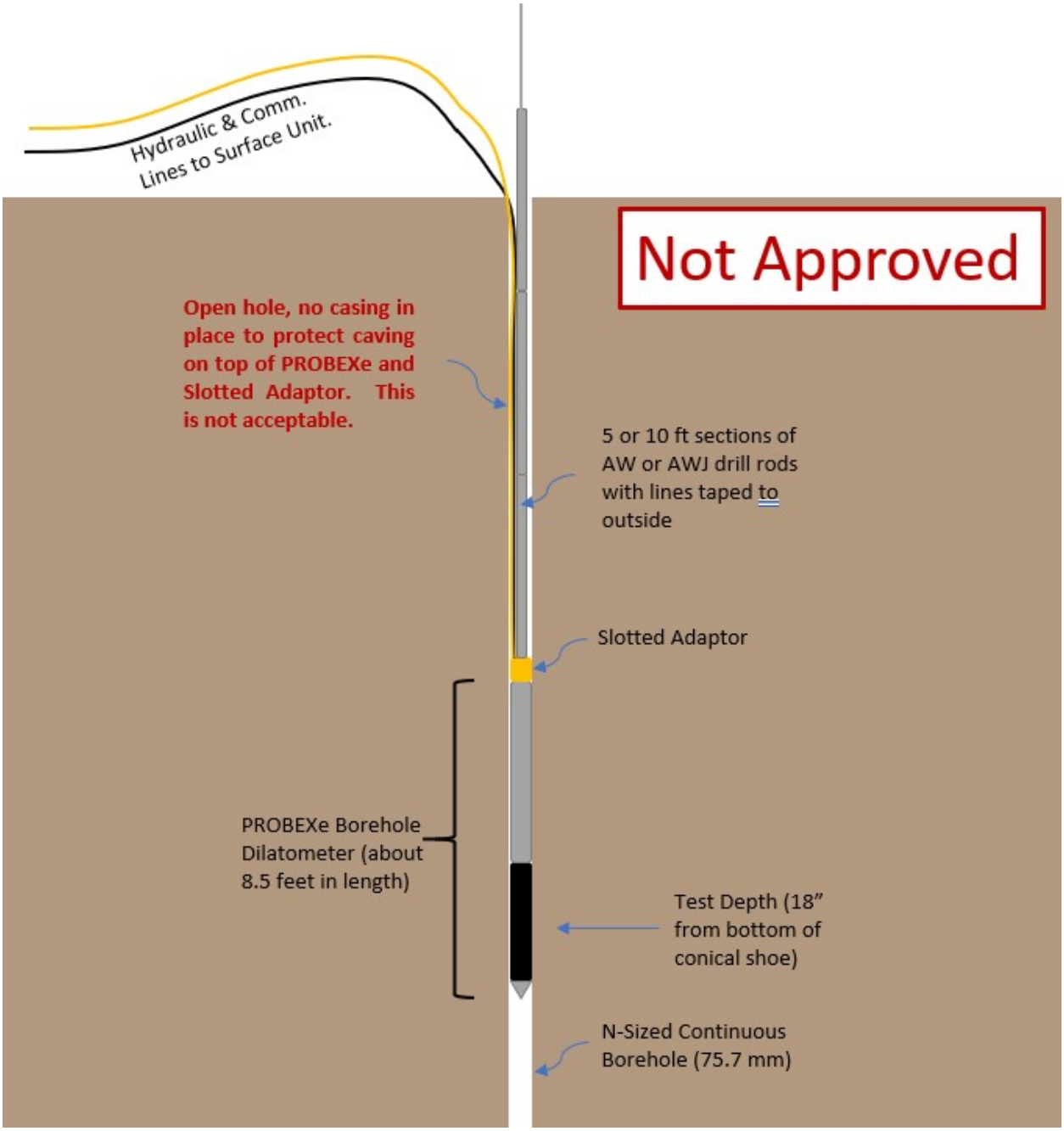
Often a drilling scope requires a larger diameter core for other testing (downhole geophysics, packer testing, etc.). If this is the case, the hole can be cored to just above the test depth of interest with larger tooling, and a test pocket about 5 feet in length can be cored with N-Sized tooling within the larger system. *However, the larger core tooling/casing system must be left in place, or the probe assembly must be inserted as a flush system as described in Method A.*

For example: Say you need a borehole dilatometer test at 58 feet. The hole can be cored with H-sized tooling to a depth of 55 feet. Then the inner barrel of the wireline system can be retrieved, and an N-sized system can be telescoped within the H-sized system, wherein a 5-foot core run can be completed, and the tooling can be retrieved. In this case, as long as the H-sized core steel is still in place to a depth of 55 feet, the probe assembly can be lowered down on AW or AWJ drill rods and seated within the test pocket at the appropriate test depth. This is acceptable because the dilatometer probe is about 8½ feet long, which means the top of the probe where it attaches to the AW or AWJ drill rods would be inside of the H-sized core steel during the test, and there is no risk of cave-in on top of the probe itself and the hydraulic and communication lines are protected within the H-sized casing. After the test is complete, the probe assembly can be retrieved, the H-sized inner barrel can be inserted, and coring can continue to just above the next test depth of interest.

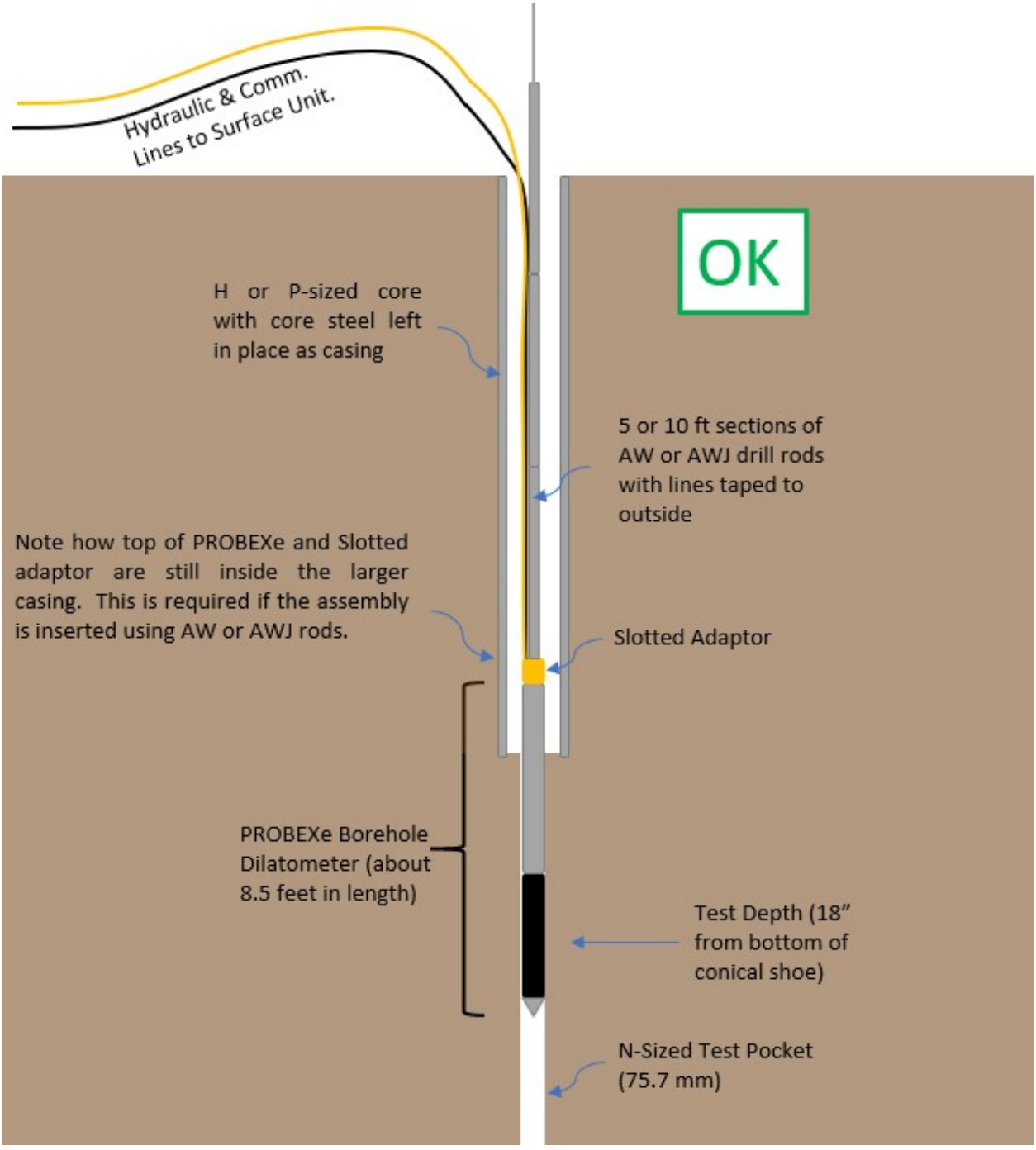
The following diagrams show acceptable and unacceptable probe assembly insertion procedures.

Method A – Continuous N-Sized Core




Hydraulic & Comm.
Lines to Surface Unit.
Not Approved
Open hole, no casing in place to protect caving on top of PROBEXe and Slotted Adaptor. This is not acceptable.
5 or 10 ft sections of AW or AWJ drill rods with lines taped to outside
Slotted Adaptor
PROBEXe Borehole Dilatometer (about 8.5 feet in length)
Test Depth (18" from bottom of conical shoe)
N-Sized Continuous Borehole (75.7 mm)

Method B: H or P-Sized Core with N-Sized Test Pocket



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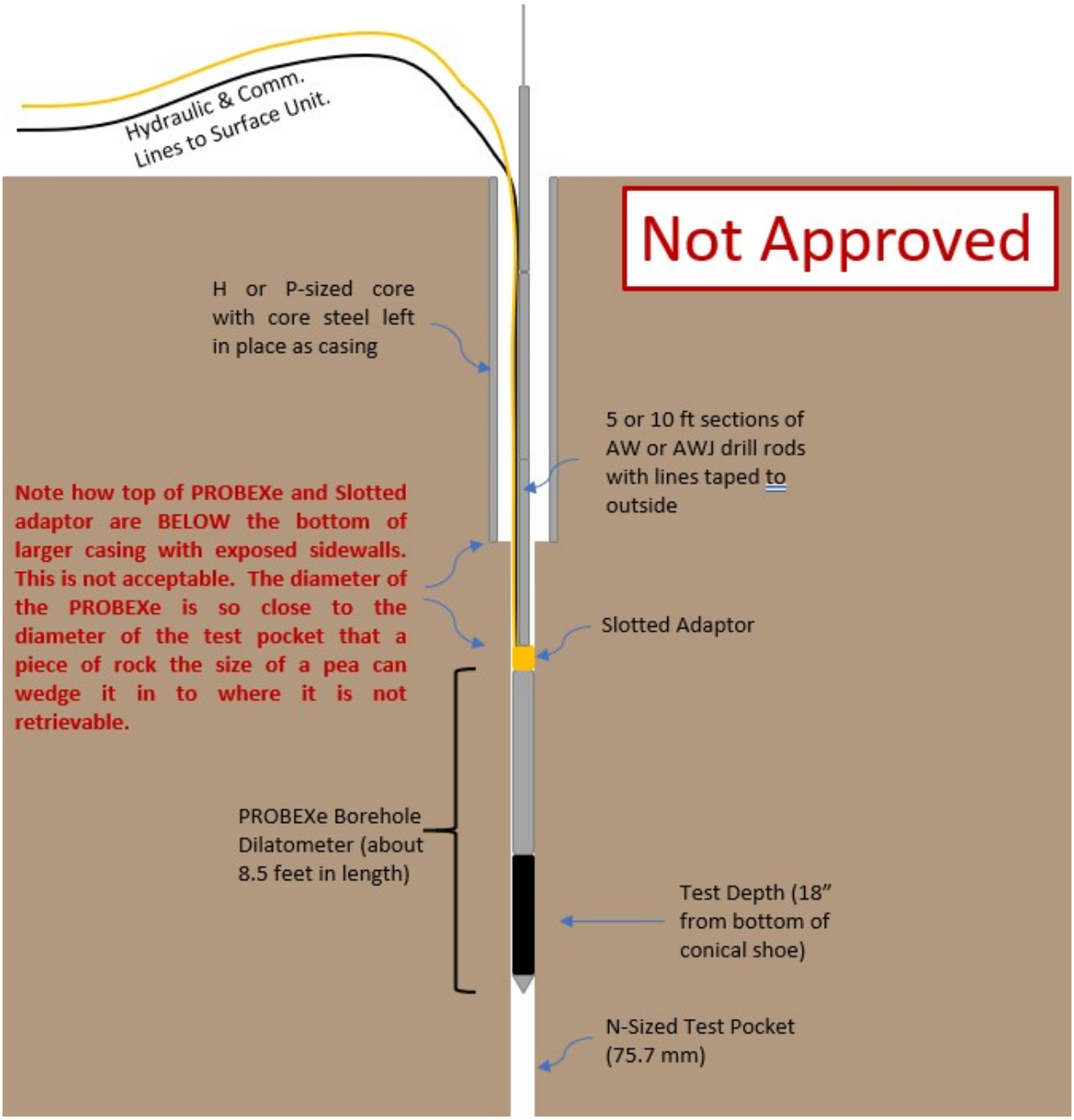

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