

# TRENCH SLOPE PROTRACTOR

SOIL OR ROCK TYPE

COPMPRESSIVE STRENGTH –  
TONS PER SQUARE FOOT (tsf)

MAXIMUM ALLOWABLE SLOPE (H:V)1  
(FOR EVACUATIONS LESS THAN 20FT. DEEP)2

<b>Stable Rock</b>		Vertical (90 degrees)
<b>Type A</b> – Most stable soil: clay, silty clay, and hardpan (resists penetration). No soil is Type A if it is fissured, is subject to vibration of any type, has previously been disturbed, or has seeping water.	1.5 tsf or greater	3/4H: 1V (53 degrees)2
<b>Type B</b> – Medium, stable soil, silt, sandy loam, medium clay and unstable dry rock, previously disturbed solids unless otherwise classified as Type C; soils that meet the requirements of Type A but are fissured or subject to vibration.	Greater than 0.5 tsf but less than 1.5 tsf	1H: 1V (45 degrees)
<b>Type C</b> – Least stable soil: gravel, loamy sand, soft clay, submerged or dense, heavy unstable rock, and soil from which water is freely seeping.	0.5 tsf or less	1 ½ H: 1V (34 degrees)

**Footnotes:**

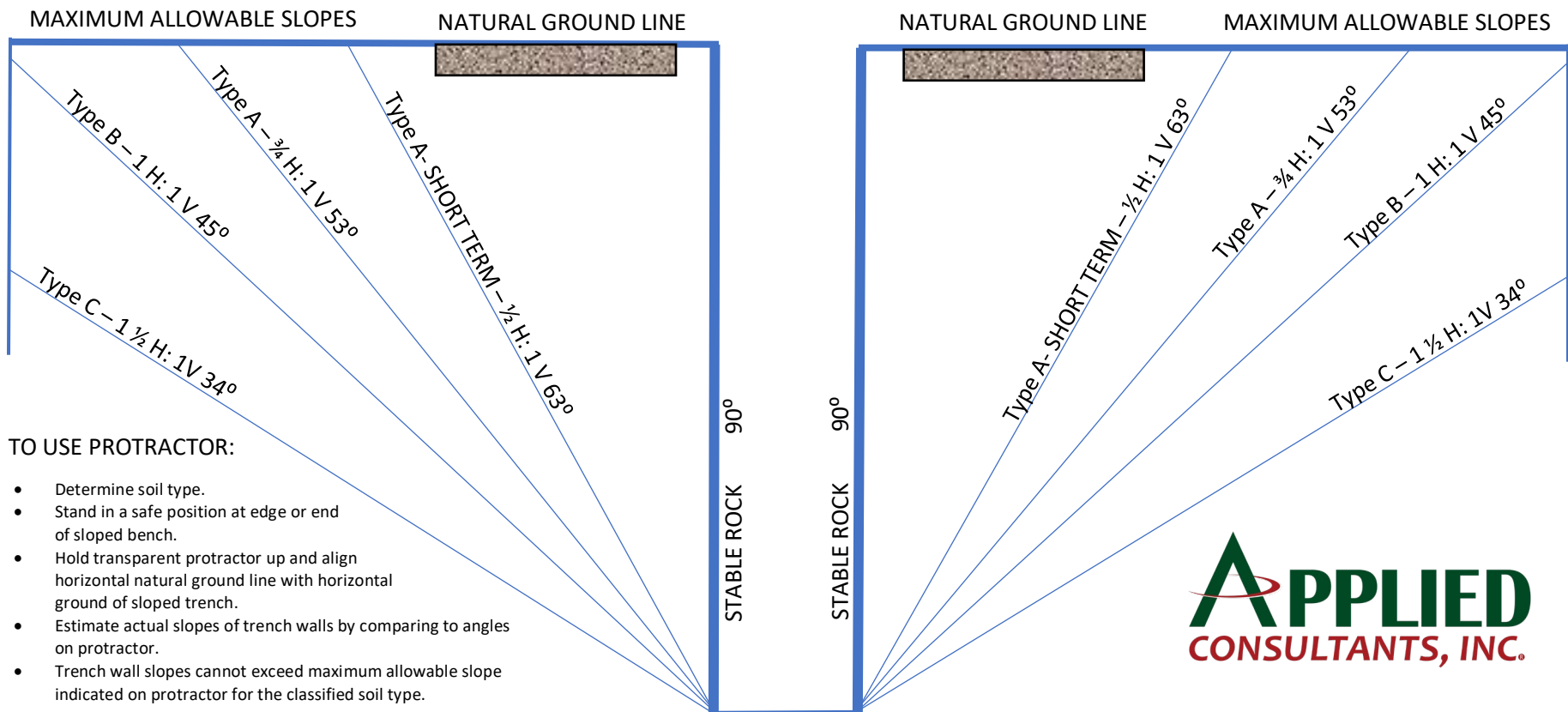
1) H denotes horizontal, V denotes Vertical.

2) Exception: for a short-term trench (trench open for 24 hrs. or less) maximum allowable slope of 1/2H: 1V(63 degrees) is allowable in excavation in Type A soil that are 12 feet or less in depth.

3) Denotes that a registered professional engineer shall design sloping or benching for excavations greater than 20 feet deep.

**Reminders:**

- Workers only allowed in unprotected excavation that are entirely in stable rock; pr excavations in less than 5 feet deep (4 feet in Washington State) and is **approved by a competent person**.
- No unsupported vertical sided lower portion of trench allowed in type B (except for cohesive B soils). C Soils without shielding or support system. Benching allowed in Type A soils and cohesive B soils.
- Means of egress (ramps or ladders) must be provided for trenches 4 feet or more in depth. Workers shall not have to travel more than 25 feet to exit from excavation.
- Ladders must extend 3 feet above top of excavation. Support or shield system must extend at least 18 inches above the top of the vertical side of excavation.
- Spoil piles must be kept a minimum of 2 feet from edge of excavation



**TO USE PROTRACTOR:**

- Determine soil type.
- Stand in a safe position at edge or end of sloped bench.
- Hold transparent protractor up and align horizontal natural ground line with horizontal ground of sloped trench.
- Estimate actual slopes of trench walls by comparing to angles on protractor.
- Trench wall slopes cannot exceed maximum allowable slope indicated on protractor for the classified soil type.

