



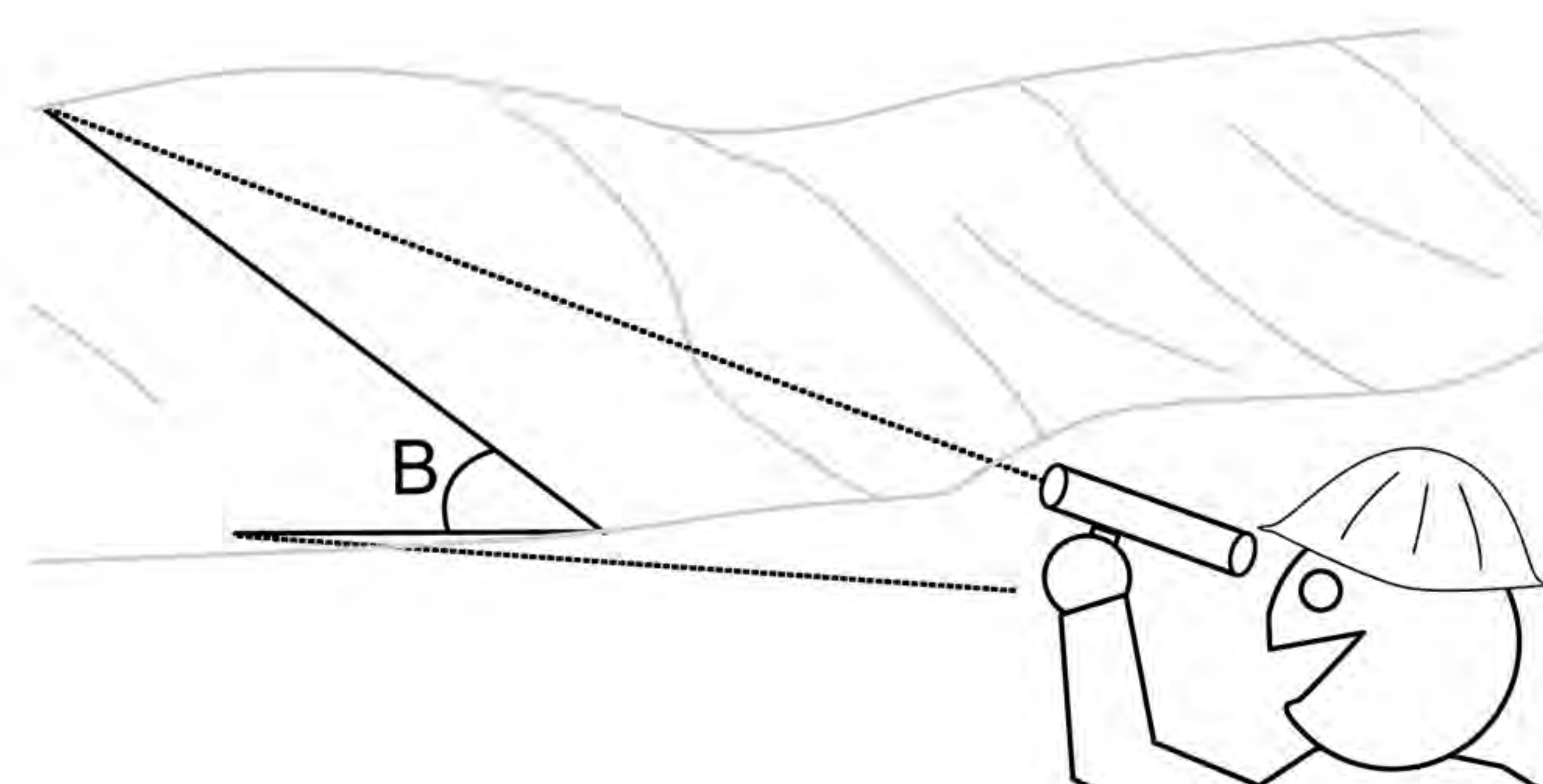


Stump Anchor Quick Reference








This reference is intended as general guidance only.
Final anchor design should be prepared by qualified personnel.

Step 1. Establish site conditions and locate potential stump anchors.

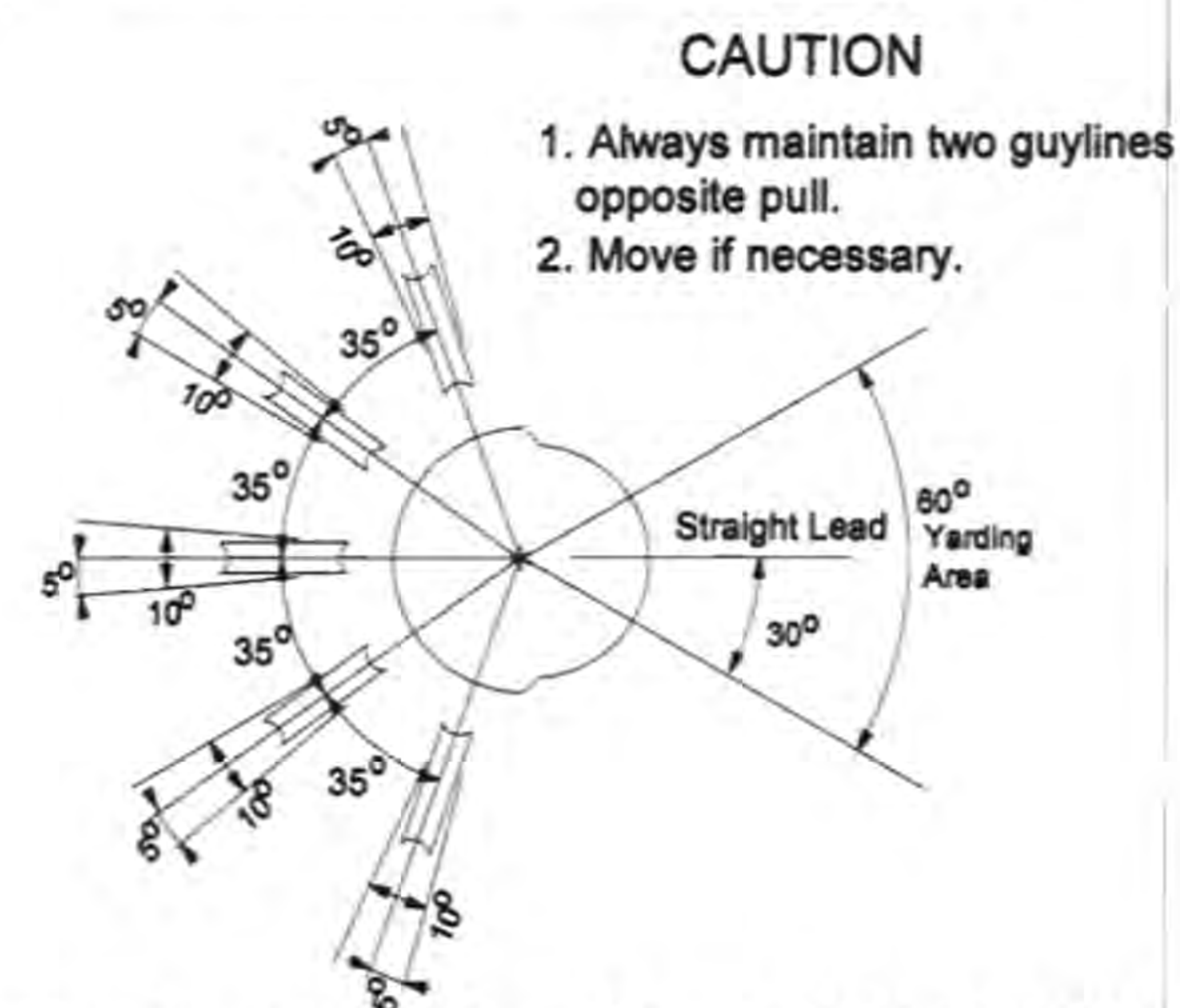
-  Determine the maximum expected load that will be enacted on the stump.
-  Determine the angle of pull, the slope of the ground, nearby tree species, tree diameters and relative locations from yarder or tailspar. A clinometer may be useful in determining line and slope angles.
-  Note that tree species, tree diameter, soil moisture and cable angle will greatly affect stump holding capacity.
-  Avoid using actual trees - ensure that only stumps from recently felled trees are used as anchors. When a tree is used, there is greater risk for harm as anchor failure can lead to potential struck-by hazards.



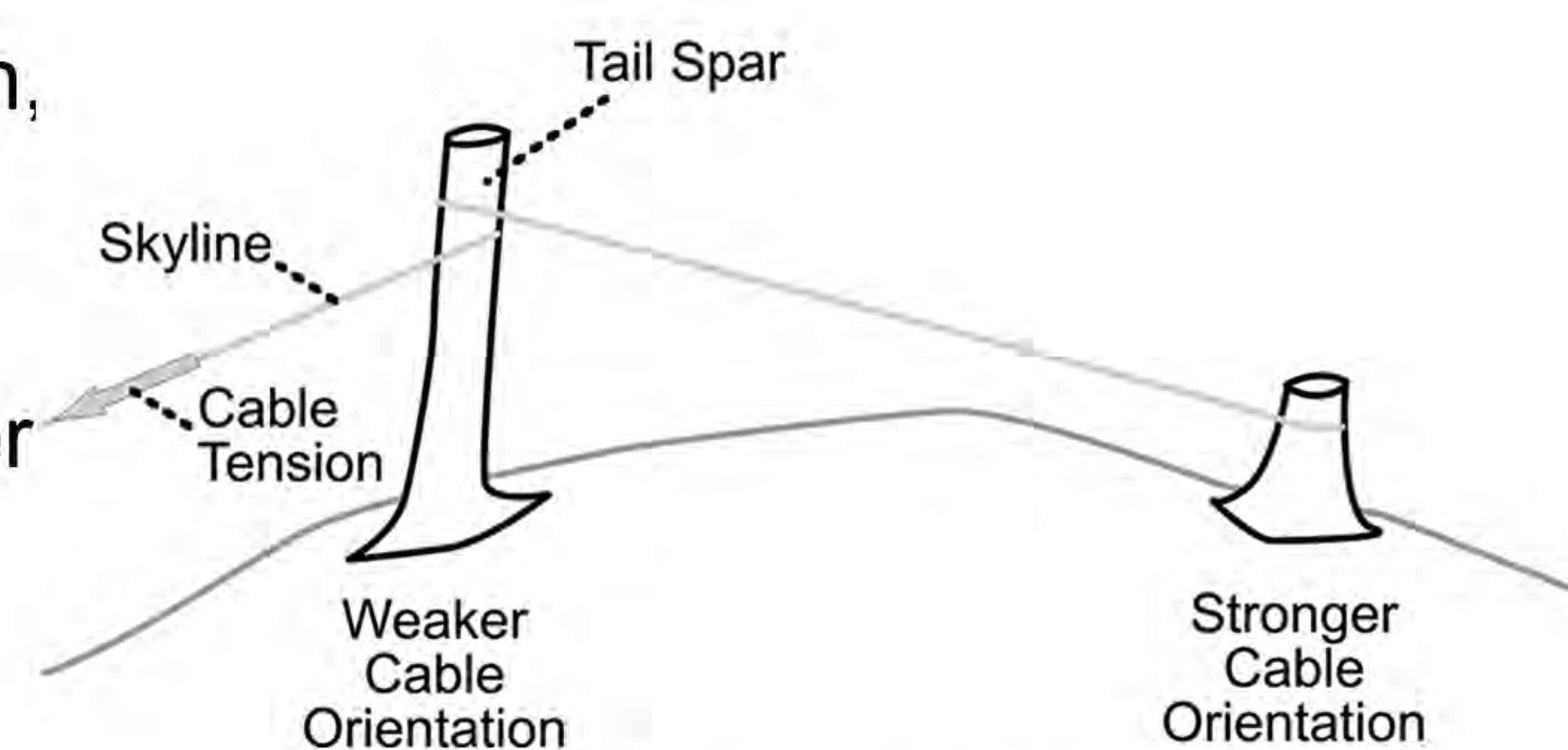
Step 2. Select potential stump anchors.

-  Ultimate Stump Capacity can be roughly estimated from diameter:
$$\text{Ultimate Capacity (lbs)} = 260(\text{DBH in inches})^2$$
However, be cautious as stump capacity is quite unpredictable.
-  Ensure guyline stumps are within "guy zones," specified as a range behind a yarder. These specifications are typically provided by the manufacturer.
-  Select anchor stumps according to the species, diameter, soil moisture and terrain. Stump anchor capacity, although not easily quantifiable, tends to increase with tree diameter and relative depth of rooting system.
-  Douglas fir is the preferred stump anchor choice. However, white pine and hemlock are alternatives. Avoid hardwoods.
-  Avoid upward pull of trees on level terrain. On steeper terrain, trees tend to demonstrate stronger resistance to pull on the uphill direction.
-  Guylines that are in line with the direction of pull of the yarder will load more quickly than guylines off to the side.
-  Avoid selection of older, rotting stumps. The wood is significantly weakened.

RECOMMENDED GUYLINE ARRANGEMENT



Example guy zone from OSHA (2007)






Effects of cable orientation.

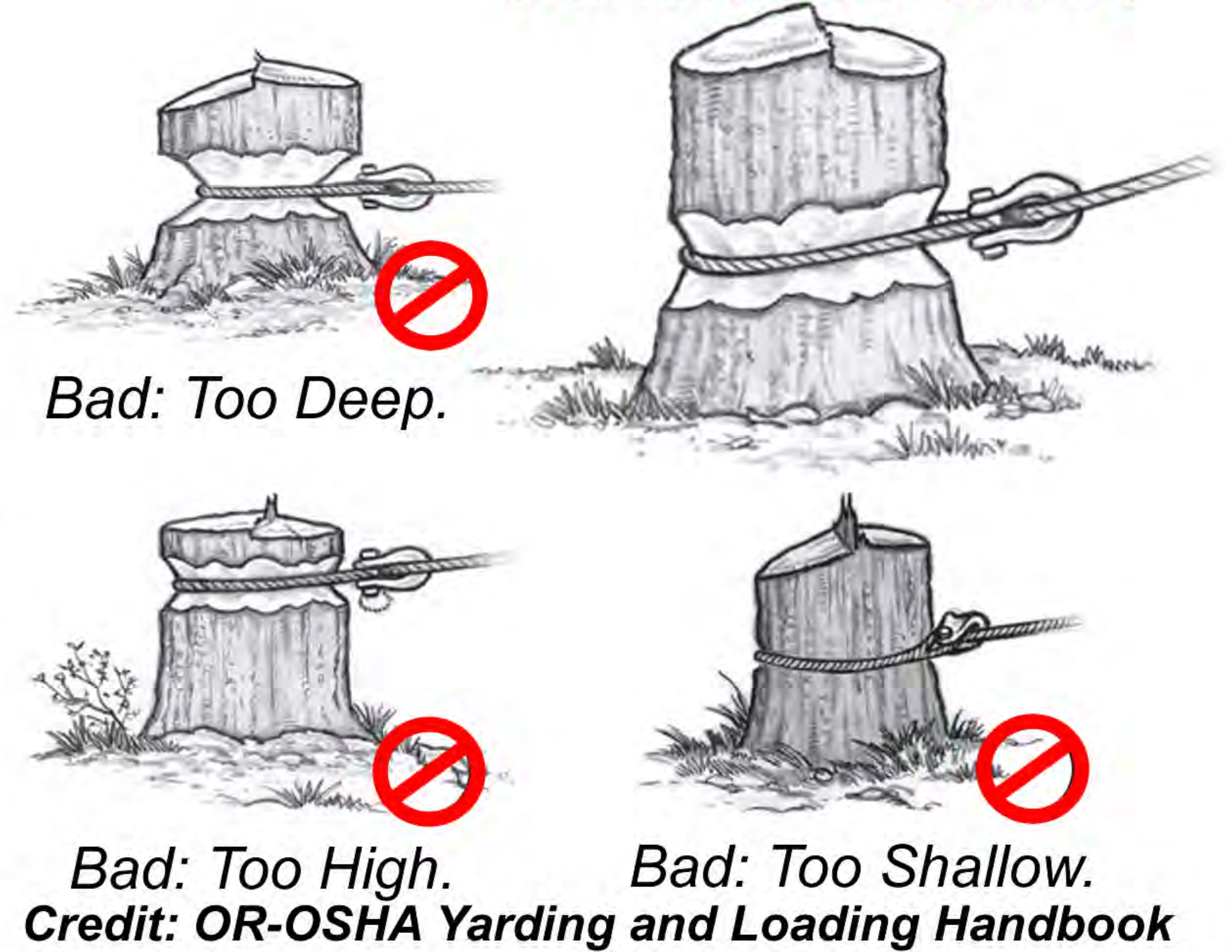
Additional considerations can be found in the OR-OSHA Yarding and Loading Handbook, which serves as the basis for this reference sheet.

Oregon Occupational Health and Safety Administration (OR-OSHA), 2010, Yarding and Loading Handbook. < <http://www.cbs.state.or.us/osha/pdf/pubs/1935.pdf> >



Step 3. Notch stump anchors correctly.

-  Clear area around selected stump to work safely. Using an axe or saw, notch a given stump anchor correctly. Be sure to wear protective gear.
-  Ensure that a notch is not excessively deep as it will reduce the effective diameter of a stump and its ultimate anchor capacity as well. Ensure that it is not excessively shallow either as the cable may not be sufficiently secured to the stump.
-  Ensure that the location of the notch is sufficiently low on the stump. It should not be within the roots, but just above it. This increases resistance from the tree roots.




CORRECT NOTCHING.



Step 4. Install anchors and ensure proper cable installation.

-  Balance the loading between stump anchors. This can be done by ensuring all guylines are in tension and of relatively equal length.
-  Ensure that sufficient deflection exists in lines, otherwise the system can be overloaded.

Step 5. Perform frequent inspections.

-  Inspect stump anchors at least daily, but more often is better. Check for line movement, soil displacement, and damage to the line to ensure proper function. If movements are noted, halt the operation and select more appropriate stump anchors or use alternative anchoring systems.
-  Note that repeated loading on stump anchors may reduce their anchor capacity. Be sure to avoid using a given stump anchor for too long.
-  Check for stump damage, including added cable notching from pull and stump rotation during inspection.

Additional considerations can be found in the OR-OSHA Yarding and Loading Handbook, which serves as the basis for this reference sheet.

Oregon Occupational Health and Safety Administration (OR-OSHA), 2010, Yarding and Loading Handbook. < <http://www.cbs.state.or.us/osha/pdf/pubs/1935.pdf> >

A Collaborative Product of:



USDA Forest Service National
Technology and Development
Program

Oregon State
UNIVERSITY

OSU

Oregon
OSHA