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FOREWARD

Thanks for downloading The Foundations of Rescue and Rigging Anchors Systems eBook from Rigging Lab Academy.

We're pleased to offer this exclusive material to you as this is the full chapter 5 excerpt of the Rope Rescue Course Text Manual, the official course manual for all of Pat Rhodes' courses inside Rigging Lab Academy.

The amazing manual covers NFPA Levels, Awareness, Operations, and Technician and is solely intended for the exclusive use of Rigging Lab Academy and Rescue Response Gear members only.

Pat Rhodes is the founder of Rescue RIG, an organization specializing in technical rope access and rescue training. He is also an instructor at Rigging Lab Academy, the planet's #1 digital platform for premier learning in the global rigging community, and has created some amazing courses with us.



Pat accrued over 40 years of experience in the field of technical rescue including 28 years with the Phoenix Fire Department as a firefighter/rescue technician and nine years as a FEMA Rescue Specialist. As part of his responsibilities with D2000, he specializes in developing advanced curriculum focusing on all aspects of technical rope rescue. Pat is also responsible for instructor development and client relations.

Pat has been instrumental in building a global brand and impacting tens of thousands of people across the planet with his humor and humble experience. What he has to say is important.

Thanks for hanging out with us,

LANCE PIATT



INTRODUCTION

Anchors are the most critical component of any rope rescue system. The entire rescue is in jeopardy if the anchors are not reliable.

Anchor systems are made up of two major elements:

- 1.** Choosing the best anchor (i.e. boulders, vehicles, trees, and bolts)
- 2.** Rigging the anchor

Building an anchor system requires much practice and experience. When dealing with structures, chose anchor points which are part of the inherent structure of the building. This includes columns, beams, anchors for window cleaning equipment, and elevator housings. Avoid corroded metal, weathered stonework, and deteriorated mortar. Avoid using vents, flashing, gutters, and chimneys.

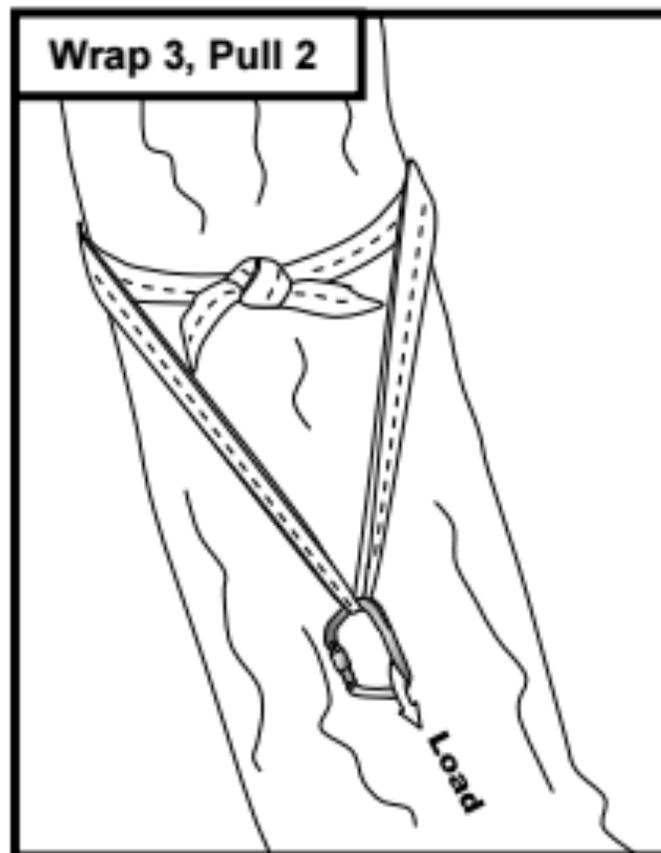
When using a vehicle for an anchor, remove the ignition key, set the brake and chock the wheels. Do not use the bumper. Connect directly to the vehicle frame using such items as the axle, cross member or tow hooks.

Often a desirable anchor is off to the side of a needed direction of pull. Ideally, they should be directly above and close to the fall line. When this is not possible (which seems to be more times than not) advanced anchor rigging skills come into play, namely, focusing the direction of the main anchor to a viable position.

WRAP 3, PULL 2

Based on the diameter of the anchor, select an appropriate length of webbing, wrap the webbing around the anchor 3 times, and tie an overhand follow through bend with its ends. Dress the wraps in a way that will position the bend on the first wrap and next to the anchor, pull the remaining two wraps and attach a steel carabiner (with the gate pointing down hill from the anchor). Attach the next link of the system to this carabiner, i.e. anchor plate, figure 8 on a bight, systems rack or tandem prusik belay.

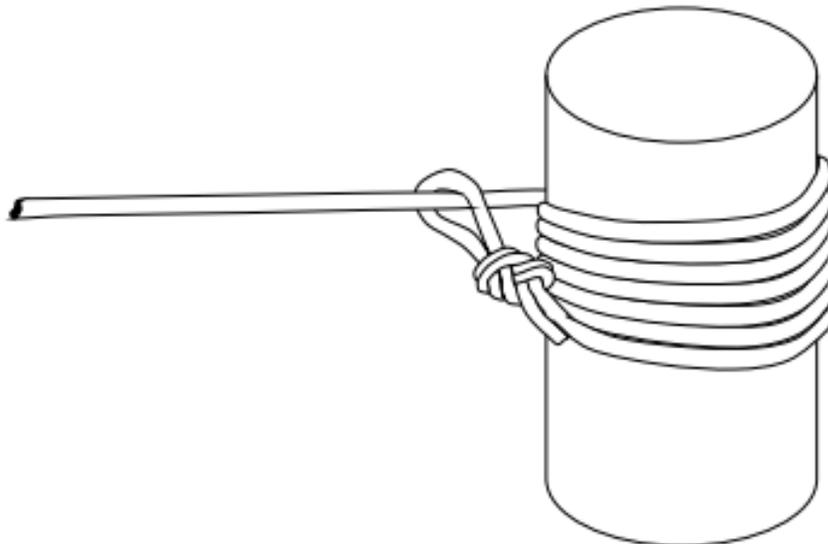
Rope may be used in place of webbing when wrapping very large anchors, i.e. a boulder ten feet in diameter.



HIGH STRENGTH TIE-OFF

A high strength tie-off is used when maximum strength of the rope is needed, i.e. highline operations.

The “high strength tie-off” is made by wrapping the line enough times around a “bombproof” anchor to take the tension off the knot on the last wrap. The smaller the diameter of the anchor the more wraps of the rope is needed.

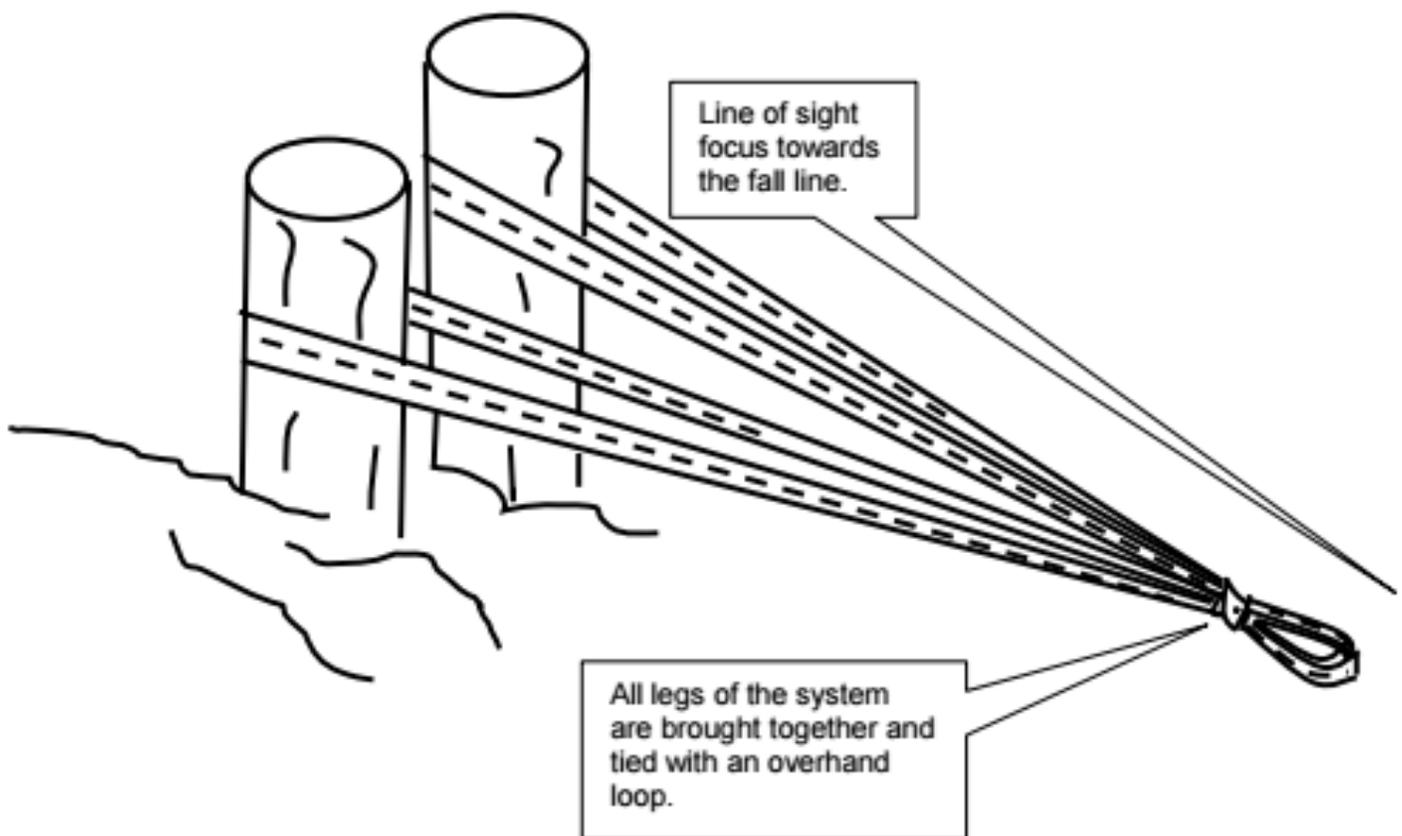


Tie a "figure 8 on a bight" or a “bowline” on the working end of the rope, and connect this knot to the standing rope just in front of the first wrap by using a steel carabiner. It is also acceptable to simply tie the tail of the last wrap around the standing part of the rope.

As a rule of thumb for a high strength tie-off, avoid using anchors that are less than 3 inches in diameter.

FIXED MULTI-POINT ANCHOR SYSTEM (LOAD SHARING)

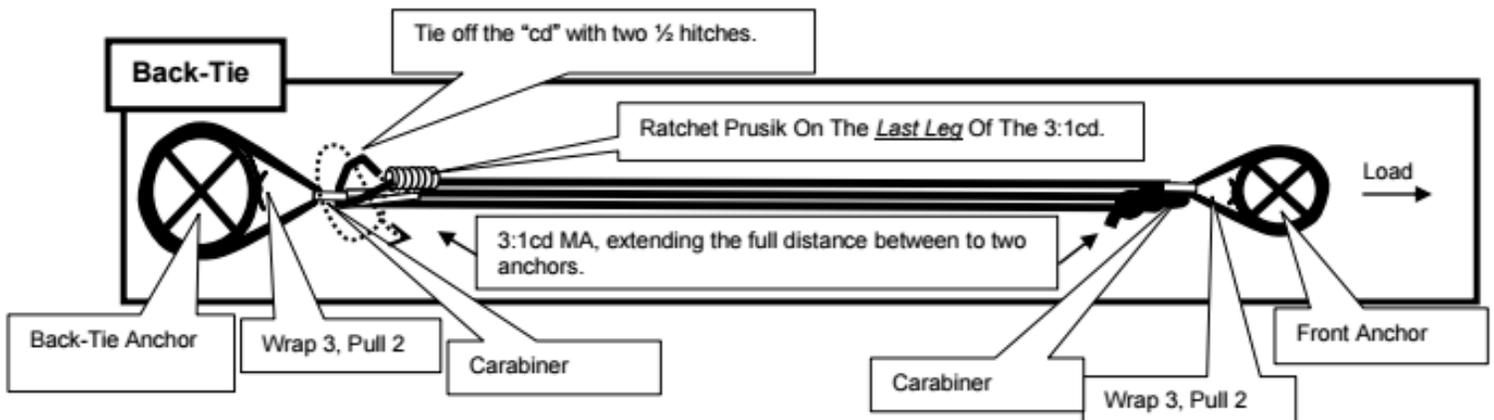
Like a self-equalizing system, load sharing is used to combine multiple marginal anchors to one focused point. In addition, load sharing is also useful in taking two solid anchors to focus a more desirable location for the fall line.



BACK-TIES

Sometimes a questionable anchor, that has a preferable location to the fall line, can be used by anchoring that questionable anchor to a bombproof anchor. This is done by back-ties, typically using the wrap 3, pull 2 technique on both anchors, then connecting the two anchors by using a 3:1cd MA. All 3 legs of the MA should extend the full distance between the front anchor and the back anchor.

By using this full-length MA, rope stretch in the “back-tie” will be kept to a minimum. Note in the diagram below that the ratchet prusik is applied to the last leg of the MA. (in a normal MA setup, the ratchet would be on the first leg, closest to the load) By doing this, all three legs of the MA are tensioned. Given that the purpose of utilizing three legs of tensioned rope is to mitigate rope stretch and that MA efficiency is of little concern in this application, carabiners should be used in place of pulleys.



OPPOSITION ANCHORS

Opposition anchors do what their names imply, that is, they pull opposite of the direction of activity. Opposition anchors are often used to secure high directional systems such as “A” frames and “gin poles”.

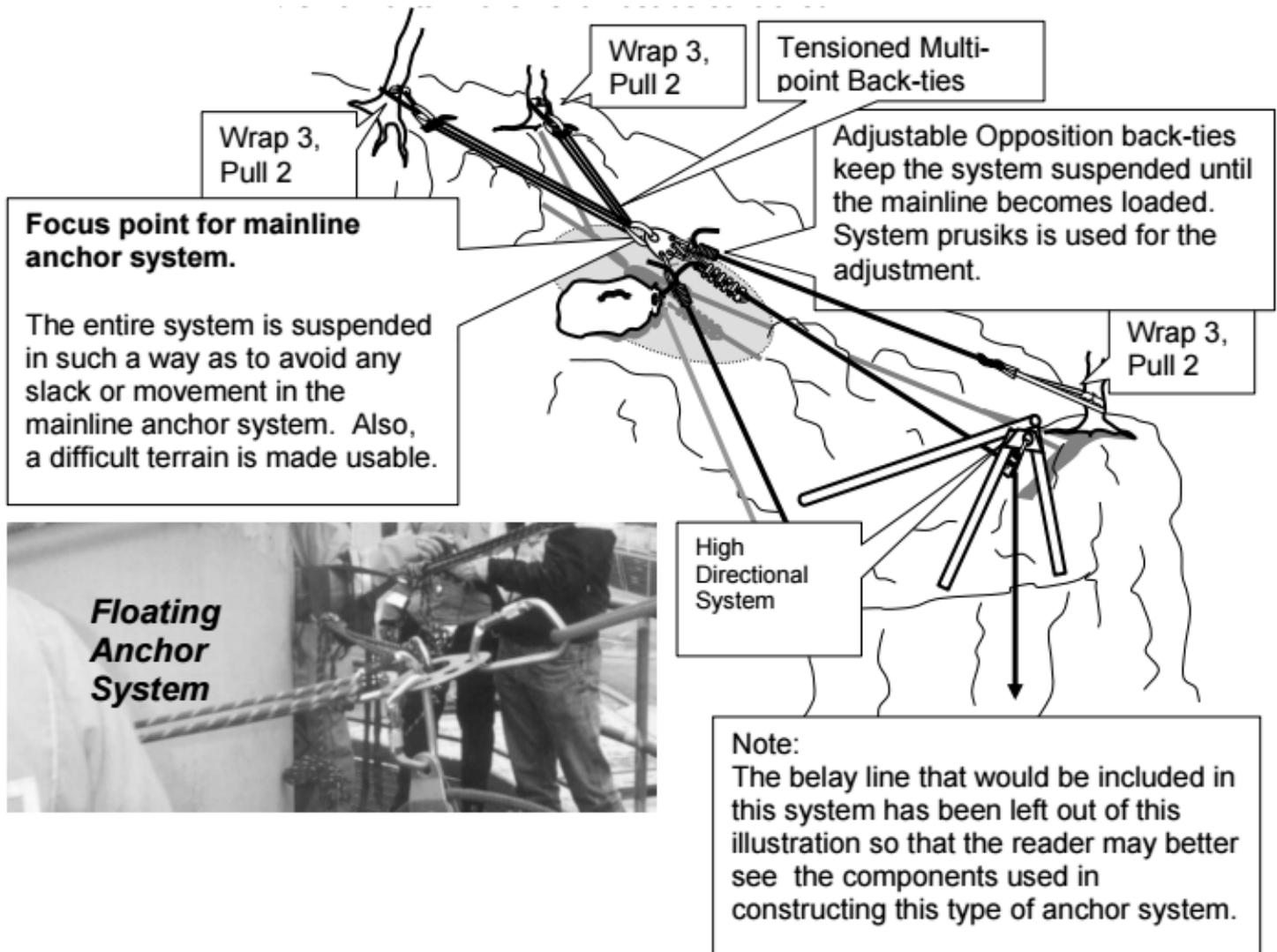
Opposition anchors are also important in supplying a forward force to “Floating Anchors”, allowing the floating anchor to hold position with no slack in the main anchor legs.

This forward force continues until the force of the rescue operation becomes greater. When this occurs, the opposition anchor system may become slack, this flexing of the system is considered normal.



FLOATING ANCHORS

Floating anchors are constructed in harmony with the combination of multi-point, back-ties, and opposition anchors. Typically, these anchors are focused in a needed position where no natural anchors are to be found. In addition, floating anchors provide suspension where horizontal movement must be controlled.



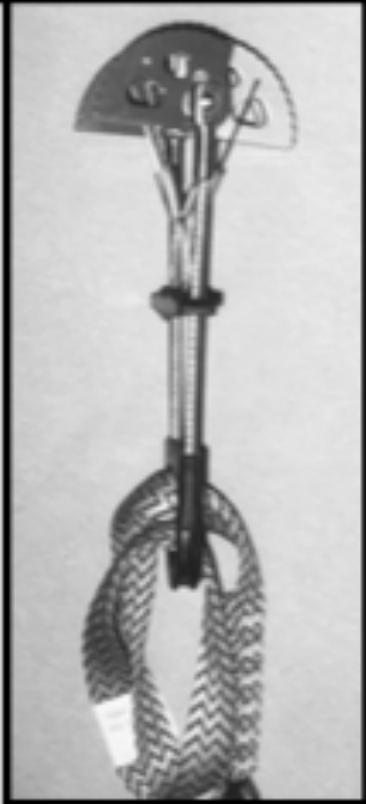
ARTIFICIAL ANCHORS

Cams, Tapers, Hexentrics, and Bolts

Although natural anchors much preferred for their expediency and strength, there will come the time when there are simply little to no viable natural anchors during the course of some rescues. It is these times we will turn to the use of artificial anchors. When used in the correct manner, a multi-point bomb proof anchor system can always be constructed.

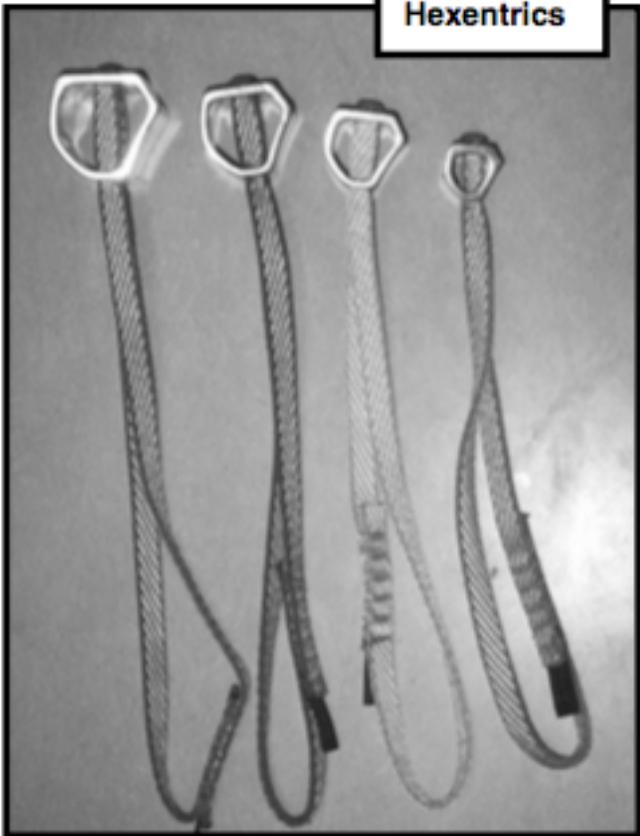
As a rule of thumb, I will always advocate the use of no less than a series of three (3) artificial anchors, brought together using a load sharing system for the purpose of supporting a system load.

Spring-Loaded Camming Device



Warning: This is an advanced rope rigging skill. Before attempting to use any form of artificial anchor, instruction in their use must be obtained through a certified school of rope rescue!

Hexentrics



Tapers



Cleaning Tool

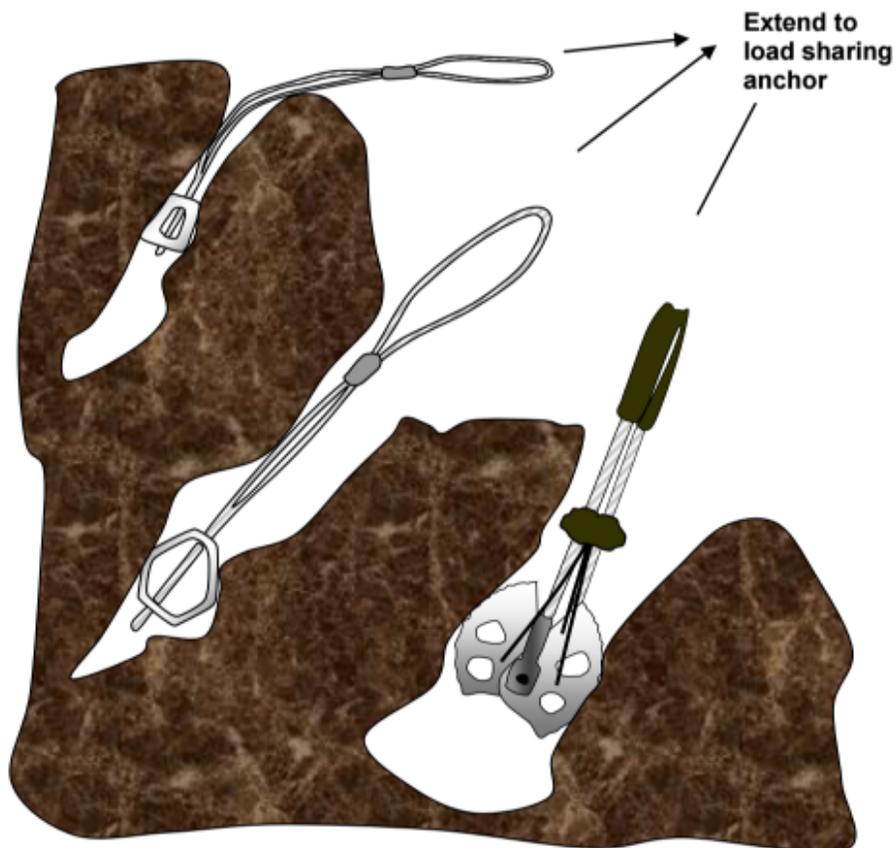


ARTIFICIAL ANCHORS

Rock Pro

This is a wonderful tool for anchor construction. It is very important to match the correct size pro with the depth and width of the crack. In addition, soft rock, such as sandstone must go much deeper than a harder rock like granite.

Again, this is an advanced skill that must be learned through years of practice under that guidance of a qualified instructor.



BOLTS

On very rare occasions, bolts may be used. The main advantage to bolting is it makes for incredibly strong anchors (when properly done) where no natural anchors exist. Unfortunately, it comes at a very high price.

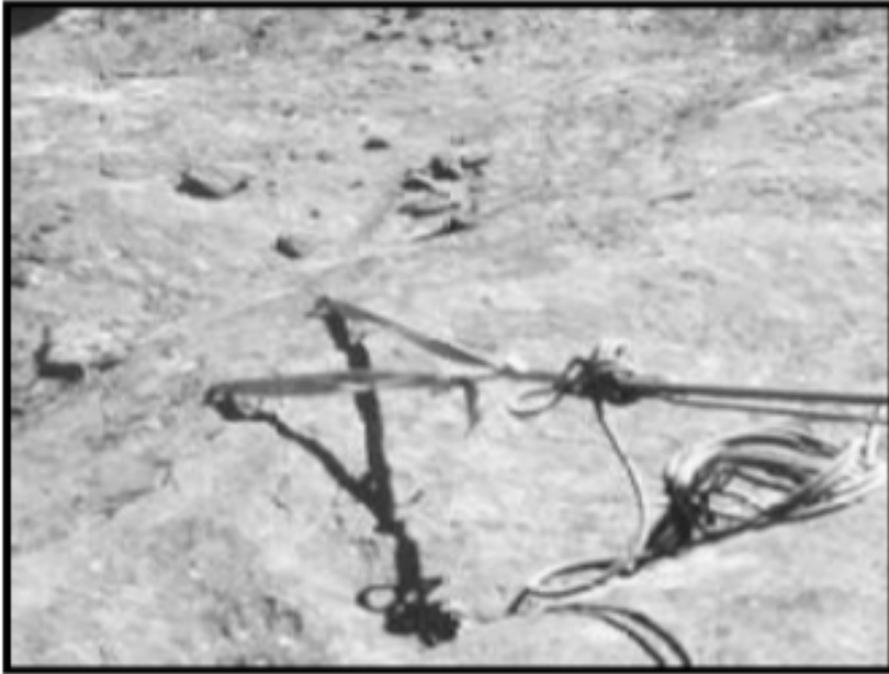


DISADVANTAGES

There are at least 3 main disadvantages to using bolts during a rescue:

- 1.** It is *very* equipment intensive, especially in the backcountry.
- 2.** Using bolts is an advanced skill that may become deadly if it is performed by an untrained rescuer.
- 3.** It scars the landscape, making the practice of this skill somewhat difficult.

Bolts and hangers used as a single point bombproof anchor should have at least a 9000-pound shear rating, typically a 3 ½ "x ¾ " bolt drilled to 3" in depth. All hangers should be made of stainless steel and must be secured with a nut.



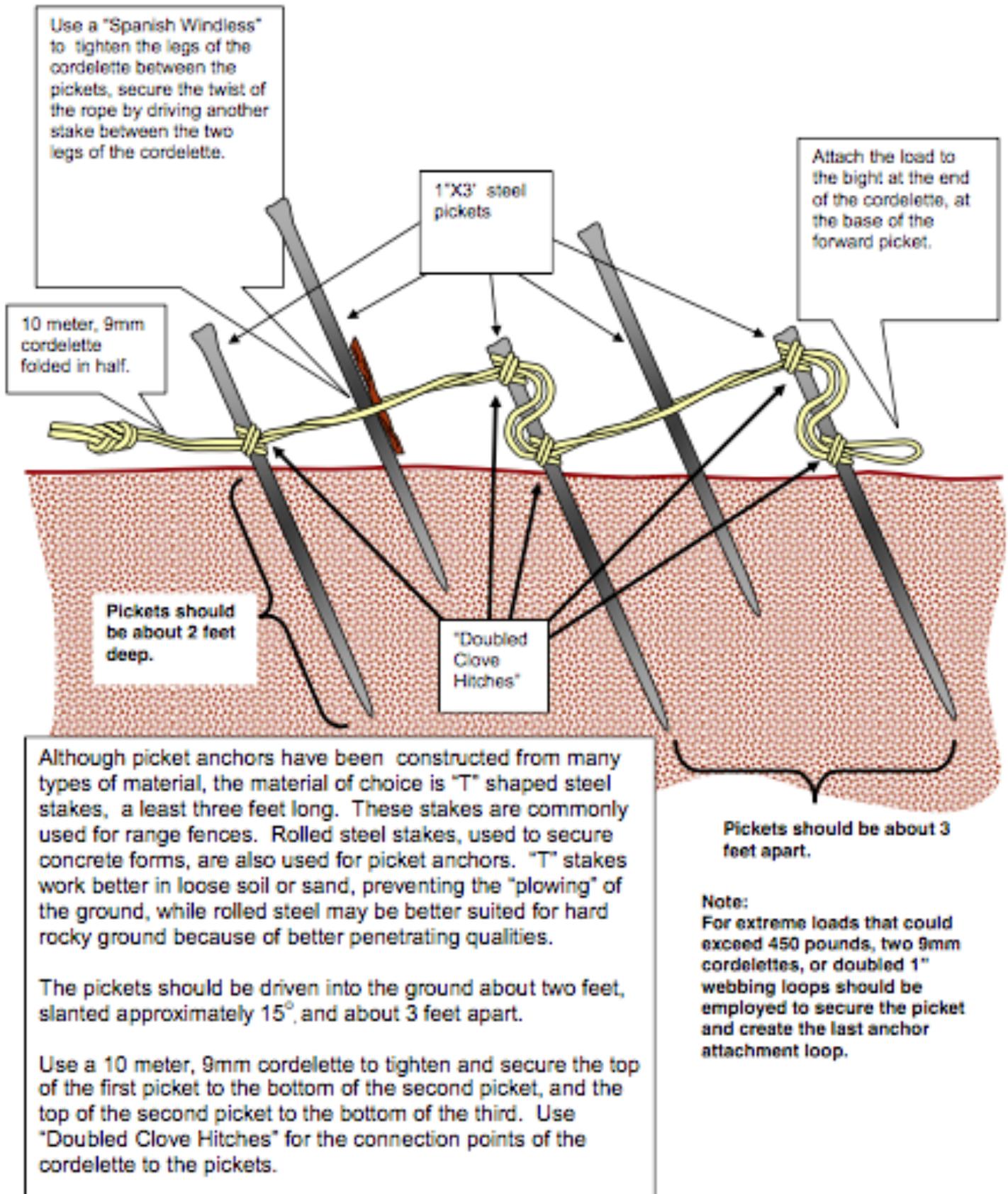
Typically, bolts used for multi-point anchors should be grouped in sets of at least two, using a load sharing system, extending each anchor to a single point.

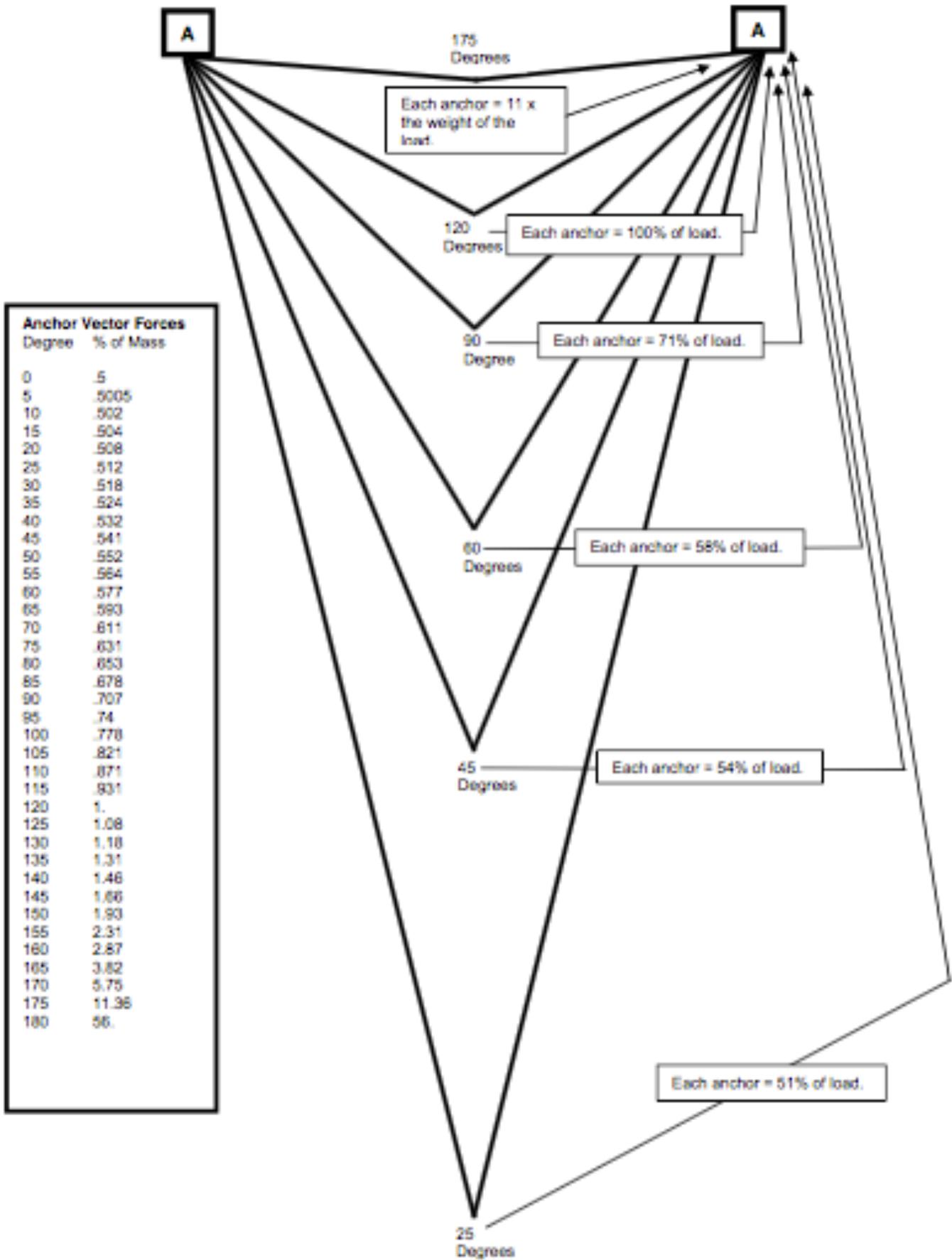
We would advise not using any bolt less than 3/8 inch in diameter for multi-point anchors. All bolts, nuts, and hangers must be installed in accordance with the manufacturer's recommendations.

There are a number of quality manufacturers of bolts suitable for rope rescue, to name a few: Star, Phillips, Hilti, and Wej-it.

Remember: The use of bolts is an advanced rigging skill, do not attempt to install bolts without proper instruction from a certified school of rope rescue.

PICKET “HOLDFAST” ANCHOR SYSTEM





WRAP UP

Thank you for joining us for The Foundations of Rescue and Rigging Anchors Systems eBook.

Anchors are the most critical component of any rope rescue system and the entire rescue is in jeopardy if the anchors are not reliable. We hope that you found the material inside this eBook to be helpful, insightful, and encouraging. If you'd like to continue learning about anchors and other rigging disciplines, we hope you'll join us over at **Rigging Lab Academy**.

Rigging Lab Academy offers new opportunities to increase your rope handling knowledge. Experience a broader spectrum and cross-pollination of rope access disciplines by viewing our growing list of courses, all designed by top rigging thought leaders from across the globe to help you bridge the gap between effectiveness and efficiency. Start increasing your knowledge of several different rigging styles. Click on the image below to check out the entire Rigging Lab Academy course library.

