

Rigging for Trail Work - Instructor Guide

About This Course

As an instructor, you will help train U.S. Department of Agriculture (USDA), Forest Service employees, cooperators, and volunteers gain more knowledge about rigging operations. The USFS does not have a Rigging Policy, therefore all our legal guidance surrounding rigging operations is given by OSHA. Jobsite specific safety will be addressed by using a reviewed and signed RA or JHA.

Per OSHA Fact Sheet:

Subpart CC – Cranes and Derricks in Construction: Qualified Rigger

»Employers must use qualified riggers during hoisting activities for assembly and disassembly work. (29 CFR 1910.67(c)(7));

Additionally, qualified riggers are required whenever workers are within the fall zone and hooking, unhooking, or guiding a load, or doing the initial connection of a load to a component or structure. (29 CFR 1910.67(c)(8)(C));

This leads us to the question, “What is a Qualified rigger?”

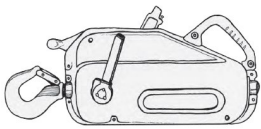
»A qualified rigger is a rigger who meets the criteria for a qualified person; Employers must determine whether a person is qualified to perform specific rigging tasks; Each qualified rigger may have different credentials or experience;

A qualified rigger is a person that;

- Possesses a recognized degree, certificate, or professional standing; or
- Has extensive knowledge, training, and experience; and
- Can successfully demonstrate the ability to solve problems related to rigging loads;

Like all aspects of rigging, rigging for trail work will fall on a spectrum of knowledge and skill. Some jobs will need more expertise and others will need less. Some people will leave this course ready to install highlines and build bridges while others may not leave with the same knowledge and skillset.

Again, from OSHA, “Employers must determine whether a person is qualified to perform specific rigging tasks”.



Course Outline

This course has seven documents.

- Instructor Guide (this document)
- Student Prework
- Risk Assessment
- Skyline Calculator (excel spreadsheet)
- PowerPoint
- Field Guide “Cheat-Sheet”
- NTDP Publication “Rigging for Trail Work”

As an instructor of this course, it is important that you have the background knowledge to deliver the curriculum successfully and safely and that you meet the OSHA definition of a “qualified rigger” for all systems you are teaching. There is much more detailed information about rigging in the NTDP publication “Rigging for Trail Work” than there is in the curriculum. It is important you know and reference often “Rigging for Trail Work”. Utilize the publication for safety and more in-depth knowledge of rigging operations and equipment. Have at least one hard-copy available during class. Have a digital version on a thumb-drive for students to copy, especially if your classroom has limited internet connectivity.

Course

The first day of class will be held in a classroom where the PowerPoint and the Skyline Calculator will be reviewed.

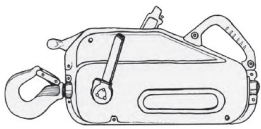
After the day in the classroom the rest of the course will be in the field. The field portion will require 2 to 4 days building systems, practicing with gear, working on safety, and practicing the math to quantify forces and reiterate was learned in the classroom.

Instructor Pre-Work

Site Selection

If possible, visit the field site early in planning a course. A good field site will:

- Be easy to access - less time driving = more time learning. Consider turn-arounds, parking, egress etc.
- Have sound anchors - Identify the systems you want to demonstrate, and what the field-site will support. For instance, if you plan to set up a skyline using live trees, be sure you have sound spar trees and anchor trees, close enough together for the length of skyline you have access to. You may choose to prep the site by clearing underneath the work area, limbing trees etc.



- A field site should be SAFE. Consider factors such as: footing, wildlife, public etc.

Equipment Preparation

As the instructor, you may choose to provide all equipment for the class, have students provide the equipment, or some combination of both.

- Providing all the equipment for the class allows you the greatest amount of control. It is important not to compromise safety, especially during a class. Model good rigging set-ups by having properly rated equipment, that is in good working order.
- Using participant's equipment during a class can be a good way for students to familiarize themselves with their rigging cache. Ask students to provide you with an inventory of the equipment they are bringing before class. Make sure everyone clearly labels their equipment and take time at the end of each day to reorganize and inspect gear.

Classroom Setup

The classroom will need chairs, tables, projector, white screen, an assortment of trails rigging gear you will use in the field, and some 5' length of cordage (5mm or 6mm is best) for students to practice knots with.

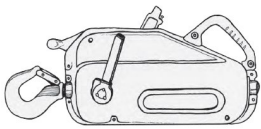
Day 1

Introduce the instructors, participants, and ask the participants their learning needs and desires for the course. This will help you tailor systems in the field to meet the student's needs.

Proceed through the PowerPoint. All slides have instructor notes to help you relay the concepts on the screen.

The PowerPoint presentation will be about 6 hours of classroom presentation. If there is time left at the end of the classroom portion of the course spending time tying knots, setting up Z-Drag type systems on the trees outside of the office and setting up a direct pull with a griphoist and a dynamometer are a good use of time. All of these activities are good ways to practice rigging skills near the office.

It is not a requirement that the class be taught with a dynamometer. If one is available, please use it in the systems you create throughout the course. Using a dynamometer adds



to safety and helps students remember the look and feel of various amounts of tension in a system for when they begin doing their own rigging projects.

Days 2-5 – Field work

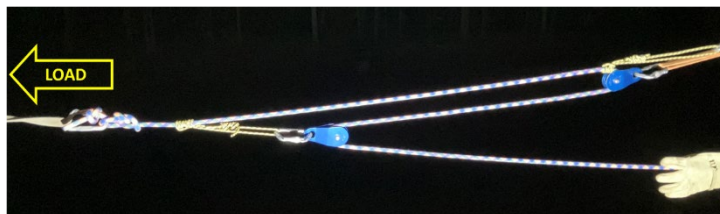
Meet at predetermined field site with all rigging gear, PPE, First Aid, review communications plan, and the Risk Assessment as a group.

Over the next few days many of the systems shown in the classroom will be demonstrated in the field. There is no set order for systems to be constructed but here are some good ideas for the instructors in the field.

Begin by setting up a straight pull between two trees, or other immobile objects. Use a dynamometer and have students bring the power source to its Working Load Limit and then slack the system again. This will let students feel how much human power is needed to bring the power source up to 2,000, 4,000, or 8,000 pounds of pull, depending on power source. This is important because when students return to their home units they may not have a dynamometer, but they will be able to approximate line tension by memory and feel.



Next set up some mechanical advantage systems with lightweight gear. If possible, use the dynamometer and compare the pull one person can generate by using a 1:1 (straight pull), 2:1 (moving block), 3:1 (z-drag) 5:1 (two double pulleys) 9:1 (double Z-Drag) and other configurations of lightweight mechanical advantages that your equipment affords you.



that one person pulling can generate somewhere between 100 and 1000 pounds of pull depending on what system is set up.

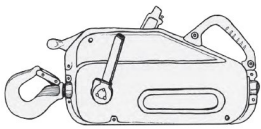
RIGGING AND CLIMBING

Rigging and tree climbing go hand in hand. The ability to put blocks higher in trees will make most aspects of rigging much more efficient.

The USFS has a climbing program and certification process. Link [Here](#).

Two or more tree climbers are required as part of a climbing team. Having additional climbers onsite during a rigging course will make the course much more efficient. If the instructors are able to keep the course participants engaged while climbers climb trees and set blocks there will be much less downtime and more time to learn.

The purpose of building and changing systems like these is to see force multipliers in action. By comparing and using a dynamometer you will be able to see

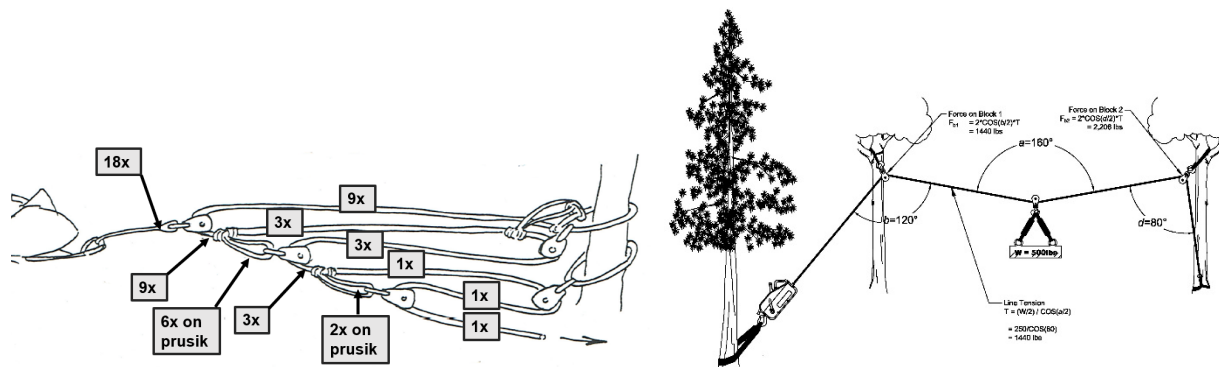


This exercise will also allow students to:

- Practice knots
- Understand force multipliers
- Quantify forces generated throughout the system
- Calculate the WLL of different aspects of the system
- Look for the weakest link in the system
- Use the dynamometer to ensure they are staying within the WLL of the weakest link

For each system built throughout the entire course quantify all the forces as shown in the diagrams below. Always ensure that all forces throughout the rigging system are known and understood. Good practice is to bring the system under light tension, then walk through EVERY component, inspecting and estimating the maximum force that each component could see, and comparing that to the WLL ratings.

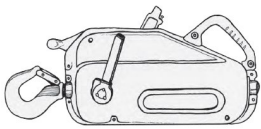
This, in combination with using rated rigging equipment that is in good working order will help provide for safety of the class and successful rigging operations.



For the remainder of the class build systems as shown in “Rigging for Trail Work” such as high lead, basic skyline, skyline on tripods, skyline on a spar pole, skyline with power source or belay added, double high lead, or skyline with a hoist.

As systems are built during the latter days of the field portion take turns assigning positions to the students such as:

- Lead rigger
- Safety Manager
- Hoist Operator
- Communications relay
- Field signage planner (If needed)
- Lookout for public (if needed)



As a course instructor you should be inspecting every portion of every rigging system to check for mistakes such as miss-tied knots, shackles used improperly, equipment in system that is not of sufficient strength, mistakes in calculations, overloading equipment, people working in the fly zone, communications set up properly and more.

Rigging can be dangerous and focusing on crew safety is paramount to safety and success. If you ever find yourself in doubt of a system's safety do not add tension, instead find different qualified riggers to check your engineering, equipment, calculations and plan before proceeding.

Course Conclusion

On the final day of the course have students help gather, clean, and inspect rigging gear before returning all the gear to the owners. If gear is damaged or worn flag the problem with a date and a description of the issue. If gear is no longer repairable destroy and discard it, so no one will accidentally use damaged rigging gear.

Once gear is clean, inspected and returned gather the class up one final time. Courses can be concluded in many ways. A good conversation at the close of the course is to read the definition of a "qualified rigger" one final time.

»A.qualified.rigger.is.a.person.that;

- Possesses.a.recognized.degree?certificate?or.professional.standing?or.
- Has.extensive.knowledge?training?and.experience?and.
- Can.successfully.demonstrate.the.ability.to.solve.problems.related.to.rigging.loads;

After reading this definition have each person in the class answer these two questions.

- Are you a qualified rigger now?
- What are your key takeaways from the course?

Then facilitate a conversation surrounding these questions.

Leave students with all your contact information and bid them farewell.