

FIELD TRIP #6 –CREVASSE RESCUE

Team Crevasse Rescue Test

FIELD TRIP #6 CR – CREVASSE RESCUE	
Time:	Date: June 2 nd Starting Time: Arrive by 6:30 am and be ready to go by 7:00 am. Duration: Eight to ten hours
Location:	<i>Panorama Point area, Mt Rainier National Park</i> <i>Meet at Paradise upper parking lot, Mt Rainier National Park</i>
Directions:	Go East on SR 512 to SR 7. South on SR 7 to SR 706 in Elbe. East on SR 706 through Ashford to the Nisqually Entrance. Pay entrance fee and continue on to Paradise.
Prerequisites:	<ul style="list-style-type: none"> ▪ Lectures: 1, 3, 4 and 5 ▪ Field Trips: #1 Prep, #1, #2, #3 and #6 Prep ▪ Pass a conditioner hike (2nd year students must also complete a conditioner in the current year prior to this field trip)
Assignments:	<ul style="list-style-type: none"> ▪ Study: Information contained in this section. Information and reading required for Field Trip #6 Prep Information required for Lecture 5
Purpose:	<ul style="list-style-type: none"> ▪ Test on 3:1 (Z) pulley crevasse rescue system ▪ Test 2:1 (single/C) pulley crevasse rescue system ▪ Practice prusiking

EQUIPMENT	
See Required Equipment FT 6CR on the Equipment Matrix (Lecture 1)	
Special Notes & Items	<ul style="list-style-type: none"> ▪ Map: USGS map “Mt Rainier East” ▪ Drivers need a current <i>National Park Pass</i> or pay <i>National Park entrance fee</i>

PROCEDURE

The goal of this field trip is to test the Essential Skills of Team Crevasse Rescue. When you arrive at MRNP, head up to the Paradise Overnight Parking Lot (same place you parked for FT3). Get your gear ready for a day “out on the glacier.” Make sure you have adequate food, clothing, and sun protection. It can get very hot out there.

Once everyone has arrived, instructors will check the adequacy of your clothing, ten essential systems, and equipment to go out for the field trip. We will then walk as a group to the testing area. Don’t fall behind, instructors are watching for adequate conditioning too. When we arrive at the testing area (possibly before), we will split into teams of 3-4 students. Each person will get the chance to be the fallen, middle and lead climber, taking turns performing and being evaluated in each role. NOTE: The fallen climber will be on belay at all times when near or in the crevasse/edge.

You are expected to know your knots, snow anchors, how to rope up, have your gear ready for each position on the rope, and perform an ice axe arrest. You are also expected to show up prepared with the right equipment and know how to use it. **If you do not have all equipment and clothing you will not be permitted to participate.**

NOTES:

- Parking is limited at Paradise, so please **maximize** carpools, especially from Longmire.
- All students are expected to be the fallen climber at least once, and at other times as requested by your instructors. Your patience and attention to your instructors will greatly expedite this practice.
- Nobody will leave the parking lot until all people are accounted for.
- Make plans to stay overnight Friday and Saturday night, that way you will be well rested and ready for testing. Field Trip Leaders will have a group site reserved at a nearby campground for both nights.

CREVASSE RESCUE

RESCUE METHODS

If the victim is able, he or she may be able to extricate themselves. As the climber in the crevasse, ALWAYS begin self-extrication. During a climb, the object of crevasse rescue is to remove the fallen climber from the glacier, not to set up a complicated pulley system. If you are the fallen climber, you should make every effort to **establish and maintain communication** if able. Most times a fall is shallow (knee deep to a foot over your head); simply pull yourself out. If you find yourself hanging, begin the prusiking procedures you learned at Field Trip 2. If you are wedged, do all you can to make sure your team knows it, and try to get yourself free. Stay calm and use your head; it's your best piece of equipment.

If the victim cannot extricate himself, then the rest of the party must chose a method to assist the victim out of the crevasse. The choice of which method to use is a decision that must balance available person power against the time and equipment needed. The choice is also influenced by the condition of the victim and whether the rope is entrenched in the lip.

Needed Person Power	Method	Time and Equipment
↓ DECREASES	Direct Pull Single Pulley (C-Pulley) Z-Pulley	↓ INCREASES

FIRST CHOICE should be direct pull if the pulling power is available. This could be 2 or more rope teams.

SECOND CHOICE should be the single pulley method if 2 or more rope teams are available.

THIRD CHOICE should be the Z-pulley method which can be done with 1 or more rope teams.

Note: Don't use a more time-consuming system when you have the available power to carry out a quick rescue.

3: 1 (Z)-PULLEY CREVASSE RESCUE TEST PROCEDURE

Crevasse rescue can involve many different scenarios. During this field trip we cannot practice all the possible variations because of time limitations, and therefore you will have 30 minutes to run through the given scenario. In each scenario, the team will set up, implement, and be evaluated on the Z-pulley method for rescue.

The following describes the step by step procedure for performing the Crevasse Rescue operation on this field trip using the 3:1 (Z) Pulley system with a one three-person rope team. The narrative describes the process and actions required. This information is depicted in the figures shown on the pages following the narrative.

Note: You will be required to follow the step by step method below. If you do something different, you will need to explain why, and as long as it is safe, you will still pass.

1. INITIAL FALL ROPE TEAM ARREST

Climber A has fallen into a crevasse. Climbers B and C have immediately gone into ice axe arrest and arrested the fall with their feet entrenched against the direction of pull and the rope to the victim taut.

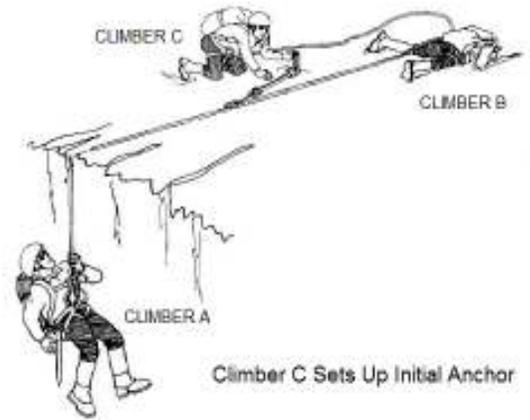
Note to the victim – Climber A: If you are climber A in the crevasse you should have your ice axe leash on your wrist (see the discussion on ice axe leash in the *Freedom of the Hills*, pg 309) and be sure you have your pack sling/perlon or a short sling girth hitched to your pack. **Be sure your gear, harness, and tie in are checked out by a teammate or instructor before entering crevasse. Wear something that will keep you dry and warm as you will be in at least ½ hour with ice water dripping down. Before approaching the crevasse lip or descending, check to be sure your belayer has you on belay (use climbing commands).** After descending (falling), you will clip the short sling from your pack onto the climbing rope between the seat harness and your prusiks, remove your pack, and carefully let it be suspended by this sling from the rope. Clip your ice axe to your harness and let it dangle. Then proceed to set up your Texas Prusiks. Do not start to climb with your Texas Prusiks until you are told the rope is anchored, then climb a few feet up the rope while awaiting rescue. You will want to unclip from chest harness when at lip of crevasse during rescue so as to safely negotiate yourself across lip.

2. FIRST STEP SET UP ANCHORS, ATTACH AND SECURE THE ROPE TO THE VICTIM

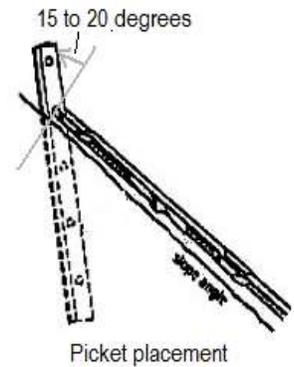
Note: *THIS IS DONE IN ANY CREVASSE RESCUE SCENARIO.*

A) SET UP INITIAL ANCHOR

- 1) Climber C (end-person) communicates with Climber B (mid-person) that he/she intends to slowly transfer the load of Climber A (the fallen climber) to Climber B to see if Climber B can hold the load alone.
- 2) If Climber B can hold the load, Climber C self-belays him/herself on the rope to Climber B by using his/her seat harness prusik sling (which is already tied into the rope). Climber C continues probing for hidden crevasses with his/her ice axe, prepared to arrest if Climber B needs help.
- 3) Climber C then probes the area around climber B to detect any hidden crevasses and then proceeds to establish an initial anchor between climber B and the fallen climber. Choose a spot near the rope to the victim, about 5 to 10 feet from Climber B, toward the victim. Climber C drives his/her picket in the slope at an angle of 15 to 25 degrees back from perpendicular to the slope, away from the direction of pull, to establish this initial anchor. A short or single webbing sling is attached to the picket at the snow line with a girth hitch. Next a Bachmann knot is tied to the climbing rope leading to the fallen Climber A using a short perlon sling and carabiner. The loop from the Bachmann knot is clipped into the webbing from the anchor using a locking carabiner. Slide the Bachmann away from the anchor until tight to the anchor.

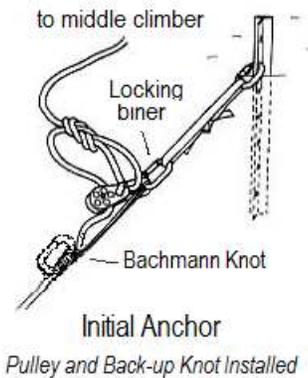


Climber C Sets Up Initial Anchor



Picket placement

- Note:** A picket for the initial anchor is preferred. If no picket is available an ice axe can be used to establish this initial anchor. However, using an ice axe precludes C (and ultimately B's) ability to self-arrest if the anchor fails.
- 4) Climber C guards this anchor by placing his/her uphill boot on the webbing adjacent to the anchor picket and takes a wide stance with the other boot toward fallen Climber A. Care shall be taken when wearing crampons.
 - 5) Climber C, communicating with Climber B, tells initial anchor is in place; and Climber B slowly transfers the load of the fallen climber to the anchor. If the anchor holds, Climber B then stands up, clips into the anchor sling with his/her personal anchor/sling and takes over guarding the anchor by facing Climber C, placing one boot on the short/single sling between the anchor and the anchor carabiner and takes a wide stance with the other boot toward the fallen Climber A. **Climber B MUST then guard this anchor until the rescue is complete.** If the anchor fails the whole rope team can be pulled into the crevasse. Climber B holds his/her ice axe in a ready to arrest position.
 - 6) Climber C places his/her rescue pulley on the now unweighted bight of climbing rope between Climber B and the Bachmann knot and uses a carabiner to clip the rescue pulley to the anchor carabiner (this shall be non-locking). It is easier to put the pulley on now, even though the team may decide to do a direct pull or C pulley.
 - 7) Climber C then takes a bight of rope between Climber B and the pulley, ties a figure 8 loop and clips it into the pulley's carabiner. This is a backup, in case the Bachmann slips.



Initial Anchor

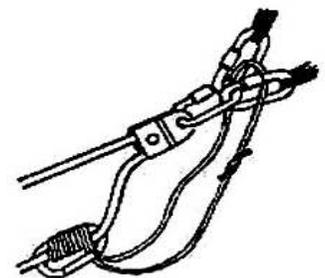
Pulley and Back-up Knot Installed

B) SET UP BACK-UP DEADMAN ANCHOR

- 1) While Climber B continues to guard the initial anchor, Climber C sets up the Main anchor, a deadman. This anchor must be strong enough to hold the full weight of the fallen Climber A for long periods and possibly the climbing party. Climber B and Climber C collaborate on equipment. Climber C needs another picket, double runner, 2 locking carabiners, 2 oval carabiners, a pulley, a leader tie off sling, and a shovel.

Note: Every rope team on a glacier climb should carry at least one shovel.

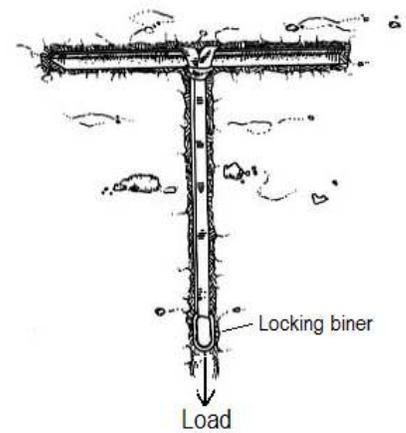
- 2) Climber C attaches a double runner with a locking carabiner clipping through both the tie off loop from the Bachmann and rescue pulley carabiner. An additional double or single runner can be attached, extending them both, to help locate the position of the main anchor. The



Pulley Attached to Two Anchors

webbing, attaching the main anchor to the initial anchor carabiner, should not have any slack when attached to the main anchor.

- 3) The main anchor should be further away from the crevasse than the initial anchor and as much as possible inline with the direction of force from the fallen climber (also at no more than a 30-degree angle to the initial anchor).
- 4) **Note:** In well consolidated snow, the best main anchor is a deadman made with a picket. Using an ice axe, dig a pit perpendicular to the direction of pull and lay in the picket with a runner attached (girth hitched or with a carabiner to the center hole on the picket). You may either tie or girth hitch a sling (single or double), to the middle hole of the picket. Extend out the runner in a channel toward the initial anchor. The deadman picket should be located so the double runner attaches to the bachman and pulley biner location. There should be little or no slack in the system. Cover the deadman and stomp the snow securely.
- 5) **DO NOT GIRTH HITCH AROUND THE ENTIRE PICKET AS SHOWN IN THE FIGURE TO THE RIGHT, ONLY GIRTH HITCH THROUGH THE HOLE. A GIRTH HITCH AROUND THE ENTIRE PICKET MAY CAUSE THE FINS TO COLLAPSE UNDER LOAD AND POSSIBLY CAUSE THE ANCHOR TO FAIL.**



Picket-deadman Anchor
< Top View of Snow >

3. SECOND STEP

EVALUATE VICTIM & SITUATION; DEVISE A PLAN FOR RESCUE

- a) Once the Main anchor is in place Climber B (mid-person) then unties from the rope to free it for use in the rescue. Climber B continues to guard the initial anchor.
- b) Climber C (end-person) then makes sure his harness prusik attached to the climbing rope is positioned such that he/she is taut to the anchor and proceeds to self-belay himself/herself to the lip of the crevasse by sliding the prusik knot along the rope while probing with an ice axe for hidden crevasses.
- c) At the edge of the crevasse, Climber C further determines the status of the fallen Climber A, evaluates his/her condition, and determines whether he/she will be able to help with rescue (assure the victim they are being rescued).
- d) Climber C also evaluates the condition of the rope leading into the crevasse to the victim as to the extent it is dug into the lip of the crevasse (entrenchment).
- e) Based on the evaluation and the resources available, this is the time in a REAL Crevasse Rescue to make a choice of rescue methods: Direct Pull vs. “C” pulley (“single rope” or “double rope” set-up) vs. “Z” pulley.
 - The Direct Pull method is preferred, as no additional setup is required. However, a second team is required to provide pulling power.
 - A “C” pulley **will** be required if the victim’s rope is severely entrenched. A “single rope” or a “double rope” system may be employed to overcome the entrenchment. (Normally the victim must be conscious and able to clip a carabiner to their harness to use the “C” Pulley.) The “single rope” system is set-up using the victim’s rope. If there is not enough rope to reach the victim, the “Z” pulley should be used to bring the victim to the crevasse edge, and then the “C” pulley should be placed to overcome the rope entrenchment. A “double rope” setup may also be used. This requires the use of a second team’s rope to reach the victim. (See the complete setup narrative under “Single or C Pulley System Double rope set-up”)
 - Both the “single” and “double rope” setups require a second team to provide pulling power.
- f) **For the purposes of this field trip the plan of choice will be the single rope team Z-Pulley rescue.** Everyone must demonstrate his/her proficiency at each role of the Z pulley method. We will also set up and perform the Single pulley (AKA “C” pulley) rescue.

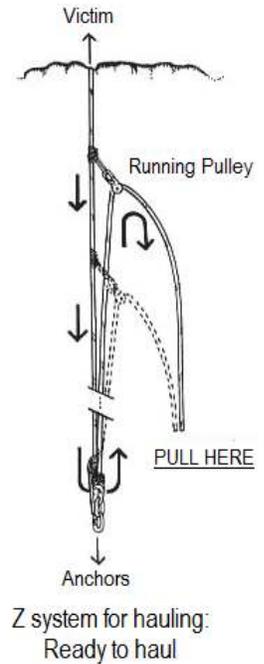
- g) Climber C pads the rescue rope leading to the victim to prevent it from digging any further into the snow by placing an ice axe under the rope, as close to the edge as possible. Drive the pick into the snow (adze up and to downhill side to prevent rope from slipping off). This ice axe is anchored by putting a carabiner on a sling girth-hitched to the ice axe (or the leash) and burying the carabiner and some of the sling in a hole scooped in the snow away from the head of the ice axe. Climber C may also need to chop/clear a pathway in the lip so Climber A can be pulled over the lip (**Caution:** This will rain debris on Climber A).
- h) **Always perform the steps above (#1 - #3) in any crevasse rescue scenario – rope team arrest, set up the anchors, evaluate the victim’s condition, and THEN choose the rescue system, such as a direct pull.**

**4. THIRD STEP:
IMPLEMENT THE PLAN**

SETTING UP Z-PULLEY

3:1 Mechanical Advantage (see sketch at right)

- a) **End person (Climber C) uses a leader tie-off loop to tie a prusik knot on the rope leading to fallen the victim (climber A) in the crevasse.** The location of this prusik knot is several feet back from the crevasse lip.
- b) Climber C then takes the rope section leading back to the anchor and first pulley and attaches the second pulley, clipping it into the prusik loop from the victim’s rope with a carabiner. There is nothing else between the two pulleys (other than the backup Figure 8 loop). Climber C then self-belays back to climber B at the anchor, clips into the anchor with his personal anchor sling, and removes the backup figure 8 knot from the anchor and unties it.



**5. FOURTH STEP:
PERFORM THE RESCUE**

Climbers B & C pull hand over hand on the climbing rope until the two pulleys are no closer than about one foot apart, or until the victim is out of the crevasse. While hauling, mid-person (climber B) keeps an eye on the Bachmann knot to ensure it doesn’t jam in the pulley. Anytime the hauling is paused the load is eased back onto the Bachmann knot by extending it away from the anchor. This should be done when Climber C needs to check the victim Climber A’s proximity to the lip or the system needs to be re-set as the victim is not yet out of the crevasse. The backup figure-eight loop knot is retied and clipped back in before resetting the system. The system is reset by Climber C moving (resetting) the floating pulley prusik back toward the edge of the crevasse (while self-belaying), checks the status of Climber A, then returning to Climber B to resume hauling. This process is repeated until the fallen Climber A is out of the crevasse.

Note: In any rescue scenario, monitor the progress of the victim (Climber A) to avoid pulling the victim into the crevasse lip, causing injury. As the victim approaches the crevasse lip, hauling should cease (pause) so the victim can remove the rope from his/her chest harness and negotiate crossing the lip safely with the assist of the rest of the rope team, if necessary. (There could be an overhanging lip which Climber A needs to chop away with the ice axe).

Note: Climber B will assist in pulling on the rope but his/her primary duty is guarding the anchor and tending the Bachmann.



2:1 (C)-PULLEY SYSTEM (SINGLE PULLEY) “DOUBLE ROPE” SET UP

This system is used if the fallen climber is conscious and able to help with the rescue and if additional help is on hand (a second rope team) to set the system up and help pull the climber out of the crevasse.

In the description below, rope team one with the fallen Climber A is assisted by a second rope team whose members are identified as 1, 2 & 3.

Rope Team one (A, B, C) completes setting the initial and main anchors as described in steps #1-3 of the crevasse rescue procedure on prior pages.

Depending on the depth of Climber A's fall, Climber 2 on the rescue rope team may need to retie closer to Climber 3 to allow enough rope to reach fallen Climber A.

Discuss when this would be suitable (victim's rope entrenched, victim able to assist and another rope team available) and walk students through the procedure. Then set up and practice the single pulley as many times as time allows. Set the initial and back up anchors as in above Z pulley procedure. Have mid-person on victim's rope (Climber B) guard the anchors and tend the Bachmann knot taking up slack so the victim's rope to the anchor is always taut. Likewise have the belayer keep the rope taut to victim as he/she is being raised.

This rescue exercise requires two rope teams. Lower the victim into the crevasse on belay. The victim is attached to initial and main anchors tended by Climber B, and also on the belay rope. The second rope team, Rescue rope team (Climbers 1, 2 & 3), practices set up and operation of Single Pulley (C Pulley) and performs the actual rescue.

- Rescue rope team belays lead climber (Climber 1) to lip of crevasse.
- Climber 1 sets up an equalized anchor, either using 1.) a picket and ice ax, 2.) two pickets, or 3.) picket and deadman (if snow conditions demand it). If an ice ax is used as part of the anchor, the sling must be girth-hitch around the shaft (NOT through the hole.) Pickets should be driven in at a 15-20 degree angle from the slope, away from the direction of pull, as near the lip of the crevasse as possible. Climber 1 attaches self to the anchor with a clove hitch on a locking biner. When tying the clove hitch, allow enough length to stand while tending the anchor.
- Climber 1 places an ice axe at the lip of crevasse and secures the ice to the anchor they just placed. (**Do not attempt to position the ice axe under the rope to the victim**).
- Climber 1 then places a pulley and locking carabiner on the bight of rope between his anchor and Climber 2. The pulley, carabiner, and rope are placed over the ice axe and carefully lowered to fallen Climber A. Climber 1 must guard the anchor at the lip from this point forward.
- Victim (Climber A) clips the locking carabiner attached to the pulley into the loop formed by the figure-8 tie-in knot on his/her seat harness. The victim then clips the “up” rope (the portion of the rope that will be pulled) through his/her chest harness carabiner. He/she signals readiness to be hauled out. Maintain the hauling rope over the ice axe at the lip.
- Climbers 2, 3 and C haul the rope hand-over-hand at climber 1's direction. As slack becomes available in the rope between fallen Climber A and Climber B (tending the Main anchor), Climber B pulls the slack through the Bachmann knot. (The safety belayer also continually removes slack in the belay line). As climber A nears the top of the crevasse, Climber 1 stops climbers 2, 3 and C from pulling long enough for Climber A to unclip the rescue rope from the chest harness. (Otherwise he/she would be pulled into the lip of the crevasse). Climber A is then carefully hauled over the lip.

