5.2 HVD DEAD END TOWER LATERAL DOWN GUY MAINTENANCE

5.2.A SUSPENDING

Suspending an employee on rope using the down guy as a tracking element:

This section contains information pertaining to suspending employees from a single rope systems on the lateral down guys of an HVD dead end tower with the intent of removing, replacing and installing new internal guy preform.

This procedure will start with the employee on the ground (ladder or platform) and a rope system powered by the ground crew up through an "armpit" block just below the connection of the down guys to the main mast of the tower (pole A, B or C). The employee will then be lifted up along the down guy via this rope system, using the bottom of three parallel down guys as the tracking element using a life-rated block (pulley). As the employee is lifted up the down guy, and if existing internal guy pre-form are present, they will be removed from the bottom two guys of the three allowing the tracking block to pass upward. This will continue until the employee reaches the maximum distance up the down guy where the internal guy pre-form is located some distance below the guy collar connection on the tower.

At the highest point, the suspended employee installs new internal guy pre-form on the trip up. Then he is lowered down and stopping at each place the internal guy pre-form is required on any of the 3 down guy position carful never to place any below his tracking block which would prevent him from being lowered to the ground.

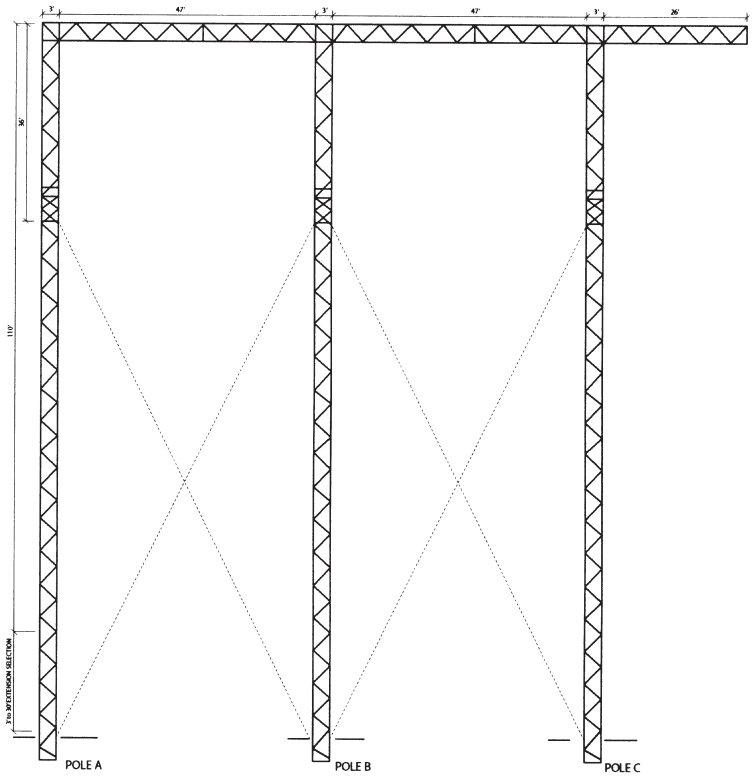

Figure 5.2.1.A.1 Towers.

By starting at the bottom and working upward to a high point, then lowering down reinstalling all internal guy pre-forms, the employee is always in a position to be lowered during a rescue (nothing below on the bottom down guy exists to stop the tracking block if the employee were incapacitated or unconscious). A rescue would thereby be easy since all that has to be done is the employee lowered to the ladder or platform at the ground level.

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Figure 5.2.1.A.2. Example of employee being lowered down guy wire to perform work.

At no time during this work is the suspended employee on the tower above the down guys of these towers, therefore will not be in proximity to any energized conductor of the phases above.

The use of the employee's safety belt around all three down guys is needed to secure them to the entire bundle of three parallel down guys. If there were any problem with the tracking block or its connection to the employee's harness, they would still be connected with their safety belt.

The employee is being belayed from above by the employee in the tower. The belay rope is connected to the rear dorsal D ring of the suspended employee's harness with a locking carabiner.

5.2.B ROPE AND GEAR REQUIREMENTS

Rope and gear requirements:

This work will require specific rope and equipment in order to be able to comply with CAL OSHA §3270.1. Use of Recommended Rope Access Equipment.

1. Yates 390FRC or Buckingham 66883Q1 full suspension harness Tower Access Harness for suspended employee
2. Petzl Ecrin BEST E-rated Helmet for suspended employee
3. Petzl Podium work seat for suspended employee
4. Fox 40 whistle for suspended employee (tether to helmet strap)
5. 1 ea. ArmorTech Rope 300′ 7/16″ minimum any color tracer (main)
6. 1 ea. ArmorTech Rope 300′ 7/16″ minimum different color tracer (deflection)
7. 2 ea. Metolius haul sack (for 300′ rope storage and deployment on towers)
8. 2 ea. CMC Rescue MPD® for 7/16″ rope
9. 5 ea. AmorTech Slings
10. 4 ea. 24″ Prusik loops (short)
11. 8 auto locking carabiners
12. 2 ea. CMC Rescue 2″ stainless steel single sheave Omni Blocks® (used on steel down guy as tracking block)
13. 4 ea. Rock Exotica 2″ single sheave Omni Blocks®
14. 1 ea. Rock Exotica 1.5″ double sheave Omni Blocks®
15. 2 ea. Petzl ASAP® Lock with integral Shock Pack
16. 1 ea. Skyhook® life-rated Standard capstan winch including:
    a. Skyhook® Pelican weatherproof case
    b. Skyhook® winch bed quick straps (red, 2″ wide)
    c. Skyhook® 2″ trailer hitch adapter mount for winch (not in case)
    d. Makita 110v power drill adapted for Skyhook®
    e. Skyhook® hand crank

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5.2.2 TAILBOARD

5.2.2.A PREPARATION

Tailboard: A proper tailboard must occur with all crew members attending:

- Key discussion points should be discussed within this manual prior to any rope access work is to be performed.
- Hazards associated with the rope access work.
- Discussion of what each person on the rope access team is responsible for.
- Main and belay line and separated anchorages.
- Status of the line being worked on — are there clearances needed?
- Method of communicating with elevated worker in a noisy environment (including the generator and capstan drill).
- Potential rescue of worker from elevation. Rescue plan.

Figure 5.2.2.A. Tailboard conducted prior to Rope Access procedures are used.

5.2.2.B COMMAND

Command structure:

- A command structure needs to be in place for the work method.
- The person on the crew who is in charge is referred to as the "controller".
- Everyones role on the team should be understood before work begins.
- Since the suspended worker and climber on one leg are elevated and the ground crew is below, a good concise, loud means of communication should be sought.

Figure 5.2.2.B. The Controller is the person set apart with a good side view of the lateral down guys on the dead end HVD tower.

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5.2.2.C VEGETATION

Vegetation/Ground preparation:

- All growth below the power line which can negatively effect the rope access operation should be removed before the work begins.
- Clean tarps will be used to keep dirt and sand off of the ropes and hardware that the rope passes through.

⚠ WARNING

Dirty rope will damage your hardware like the MPD® or pulleys.

✋ CAUTION

Vegetation should be eliminated in the area to be worked. Anticipate all pulley systems needed and cover these areas where the rope will be on the ground and cover with clean tarps.

Figure 5.2.2.C. Vegetation should be eliminated in the area to be worked.

5.2.2.D GEAR INVENTORY

Gear inventory/inspection:

- Before the work commences, all gear and rope should be inventoried
- A visual inspection of the gear by a competent person should take place before work begins.

Figure 5.2.2.D. Gear inventory and inspection by PG&E employees prior to work.

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5.2.3 DISTRIBUTE

5.2.3.A PRIOR TO EMPLOYEES BEING SUSPENDED BY ROPE SYSTEMS

Distribute ropes for HVD tower rope access work:

1. Ropes can be laid on clean ground tarps between:
   a. the HVD tower legs (pole A, B or C)
   b. a single HVD tower leg (pole A, B or C) and another down guy anchor
   c. between one tower leg and a PG&E vehicle

If vehicle is used, keys should be taken out of the ignition and assigned to the supervisor. Wheels should be blocked against the direction of pull. Brake should be set.

⚠WARNING

Make certain that the vehicle is secure and cannot roll or be moved before using it as an anchor for human loads.

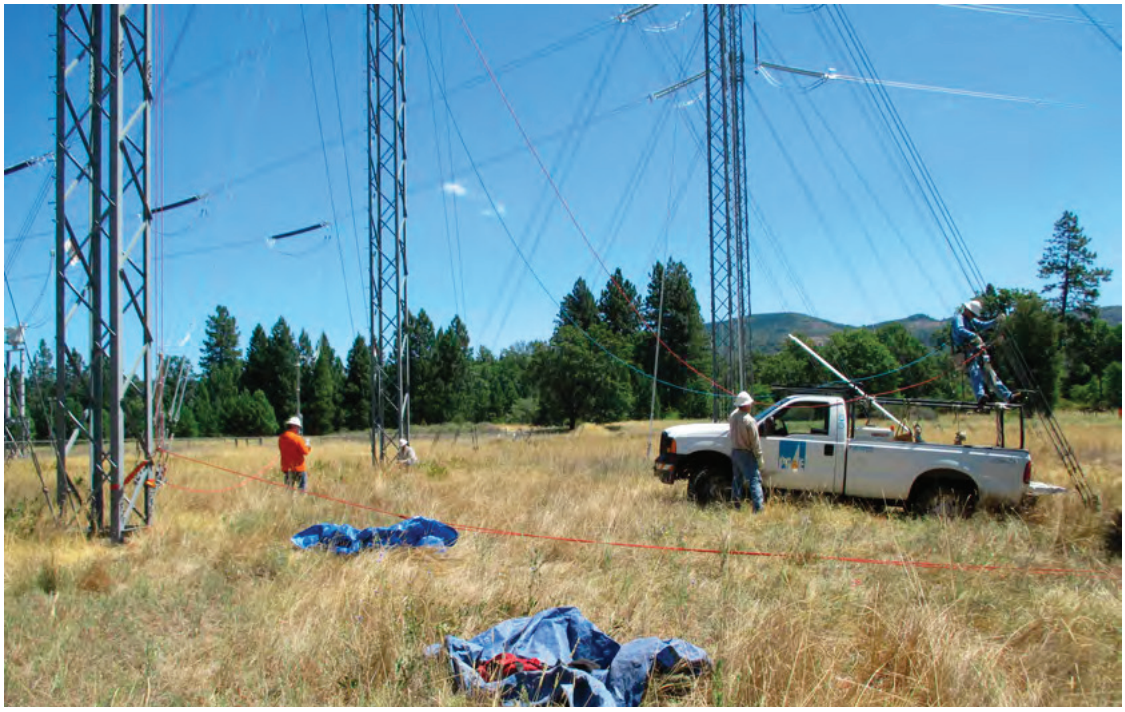

Figure 5.2.3.A. Employee preparing necessary rigging to access lateral guys.

5.2.3.B PLATFORM/LADDER

Suspended employee take off/landing ladder/platform at guy anchor:

- The employee who will be lifted and lowered along the bottom-most of three parallel down guys will need to hook up the tracking block and rope systems well above the ground. This will require a ladder, platform or platform on vehicle to get above the down guy anchoring pre-form. The pre-form is too wide for the tracking block.
- In any means of elevating the worker, be mindful of rescue from this location even though it is only a few feet off the ground. If one ladder is used for access, a second ladder would be needed to release them and get them down this last small distance.

5.2.3.C MAIN RIGGING

Make up main lifting/lowering rigging (main and belay):

1. Main:
   - Use the appropriate length rope for the main lifting/lowering line. Tie a figure of eight on a bight knot on the end and leave the knot with the worker being lifted on a temporary anchor so the end is not lost. They will hook this up when they are ready to be hoisted up the down guy.
   - Walk the bag of rope over to the base of the tower leg that corresponds to the down guy.
   - Attach a single Omni Block® (this will be the future armpit block just below the down guy collar on the tower) onto the rope coming out of the bag and give this to the tower climber when they are ready to ascend. As the climber ascends, the rope will feed out of the bag.
2. Belay:
   - Use the 125' long rope for the belay line. Tie a figure of eight on a bight knot on the end and, like the main line, leave the knot with the worker being lifted on a temporary anchor so the end is not lost. They, or ground crew member, will hook this up when they are ready to be hoisted up the down guy.
   - Take the balance of the rope in the bag and "stack" it on a clean surface. This practice is referenced as "bird nesting" the rope. When the end which was at the bottom of the bag is reached, make sure it has a double overhand stopper knot near the end.

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- Attach a Petzl ASAP® Lock with integral Shock Pack absorbing lanyard. The engraved "UP" arrow on the ASAP® should be pointing at the opposite end where the worker is being lifted, and away from the double overhand stopper knot.

⚠WARNING

The ASAP® must be placed on the rope correctly to work properly as a belay for the rope access operation.

Figure 5.2.3.C.1. Both the red main lifting/ lowering rope and the blue belay line are in place with their respective figure of eight on a bight knots. The main line attaches with a carabiner to the tri-link on the workers harness as shown and the belay line attaches with a carabiner to the rear posterior D ring on the workers harness so it is out of the way of their work.

Figure 5.2.3.C.2. The Petzl ASAP® LOCK is shown here. The "UP" arrow on the device should be pointing away from the free end where the double overhand stopper knot is tied.

NOTE: **When the ASAP® is hanging in the tower rendering downward towards the belayed operation (whether the deflection line or the main lifting lowering line) the "UP" arrow will actually be upside down, or, pointing downward. This usually causes much confusion with the climber on the tower legs as it seems that the rigging is incorrect, when it in fact is correct.**

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5.2.3.D CLIMBER

Climber responsibilities:

- The climber will bring up the now empty belay rope bag and two anchor straps. One for the main and one for the belay.
- The climber will be taking two ropes up the tower:
  a. A bight of the main lifting/lowering line on the future armpit block
  b. The end of the belay line hooked into the Petzl ASAP® Lock with integral Shock Pack absorbing lanyard.
- The stopper knot in the end of the 125′ belay rope will prevent the rope from falling out of the Petzl ASAP® LOCK. The carabiner on the ASAP® can simply be clipped to the climbers harness for climbing.
- The climber will climb to a position just below (within a 3 feet) of the down guy collar on the tower leg (pole A, B or C).
- There, the climber will establish 2 anchors on the side of the down guy being worked, one higher than the other by a small distance (no more than 3 feet) with the two anchor straps they have carried. The top most anchor should receive the Petzl ASAP® Lock with Shock Pack with the belay line still in it.
- The armpit Omni Block® may be now clipped to the remaining lower anchor strap on the tower.

CAUTION

Be careful to not drop the armpit Omni Block® as it is unclipped from the harness. It will be heavy with the rope hanging in a bight from it.

- Once the armpit Omni Block® is set, the climber can call down to the controller and ground crew to begin rigging the rope out of the bag into the MPD® and subsequently pulling up of all the unwanted slack (but not tight).
- Care must be taken by the climber to not twist any of the ropes. The ground crew may assist the climber in this task and work together in untwisting any ropes. If the climber left the ground with no twists, there should not be any issues later as he reaches his top position on the tower leg.

Figure 5.2.3.D.1.

- The empty belay rope bag may now be hung on the tower near the top anchor and the belay rope hanging from the ASAP® can be pulled up and "stuffed", end first (with stopper knot) into the open bag. Call down to the bottom and make sure they have connect the end of the belay rope to the worker being lifted. Continue to stuff rope until the belly in the belay rope down to the worker being lifted is gone. Do not pull this rope tight. Leave slightly slack for now.

⚠WARNING

The main lifting/lowering side climber should never climb past the down guy collars on the HVD tower.

⚠WARNING

The climber must be careful not to twist the ropes as he climbs the tower leg.

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Figure 5.2.3.D.2. Above, there are two separate systems being set up for each of the two lateral down guys on this HVD structure. The two climbers have used the red main lifting/lowering line to bring up the belay rope bags and other pertinent rigging for the position below the guy collar.

Figure 5.2.3.D.3. Both climbers have arrived at their position below the guy collar and each is setting up an armpit block on either side of the leg for each lateral down guy. You can see the belay rope, in its bag on the far left side.

5.2.3.E GROUND CREW

Ground crew responsibilities:

- As the climber takes the armpit Omni Block® and end of rope with ASAP® belay up the tower leg, the ground crew can begin making preparations for the main lifting/lowering line.
- A "butt block" at the base of the tower leg with the climber above will need to be established. Place an anchor strap at the base with a single sheave Omni Block®. Clip the rope coming out of the bag to this block.
- This butt block will need to "render" on the anchor strap and have a clear path to the armpit block above that the climber will establish. The rope cannot rub on the steel of the tower at any location.

Figure 5.2.3.E.1. Ground crews are preparing two independent and separate main lifting/lowering lines through butt blocks on the bottom of the tower leg B (far left). The throw of one pulley system is between the two legs (B and A, further away) and the throw of the second one is going to the crew vehicle out of view to the far right (see next photo). Note worker ready and standing on top of crew vehicle with slack main (red) and belay (blue) lines behind him.

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⚠WARNING

All ropes must be free of the steel of the tower. Adjust rigging and blocks so ropes do not rub or abrade. Any rope that does inadvertently rub must be padded with a rope protector.

Figure 5.2.3.E.2. Note the foreground pulley system (here, a 5:1 zig zag) with the progress capture MPD® anchored to the front of the crew vehicle on the right. Both workers are in position at pole B lateral down guys and on top of the vehicles acting as platforms.

- A pulley system "throw" of between 10 feet and 30 feet is required for this task between the established butt block and the pulley system progress capture device (PCD). The CMC Rescue MPD® will be the PCD for the pulley system the ground crew will construct.
- With the butt block positioned typically at the base of the tower (either pole A, B or C), the use of another tower leg 47 feet away becomes a logical choice for the PCD anchor (CMC Rescue MPD® location). Cover the area with clean tarps to keep the ropes and hardware clean.

- After the climber has reached their position above and established the armpit block on an bottom-most of two anchors, walk the bag of rope to the MPD® location on the other chosen anchor (other tower leg, down guy anchor or secured vehicle).
- Load the CMC Rescue MPD® properly as shown on the opposite chosen anchor from the butt block. Close the MPD® face plate and use a carabiner to attach the device to its anchorage (other tower leg, down guy anchor or secured vehicle). Check the loading of the MPD® by briskly jerking the rope coming out of the device. It should lock up and give a clicking sound if done properly.

⚠WARNING

Do not load the MPD® until the climber has reached their position on the tower leg and anchored the armpit block.

Figure 5.2.3.E.3. Two butt blocks, one with a load and "rendered" on the far left and the second one slack anchored on the far right.

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Figure 5.2.3.E.4. Employee at the anchored progress capture MPD® and holding onto the free end of the main lifting/lowering line.

- Slack in the main lifting/lowering line may be taken up by pulling on the "free end" of the rope coming out of the MPD®. The free end is the portion coming from the MPD® to the rope bag. Do not pull ropes up tight until the operation of lifting the worker is imminent. Leave ropes loose for now.
- Be ready to construct a pulley system (3:1, 5:1 or 7:1) by using the needed Omni Blocks®, carabiners and prusik loops.
- Everyone on the rope access team should check the rigging for accuracy.

⚠WARNING

It is mandatory to have members of the ground crew check all rigging on the ground before the lifting operation takes place. Look for twisted rigging or anchor straps, open Omni Block®s or carabiners and rope that may rub on steel, obstructions or vegetation. Early correction before ropes are loaded is best practice.

5.2.3.F MANUAL LIFT

Manual lift or life-rated capstan winch:

Two methods of lifting are used depending on manpower and resources.

1. Manual lift with a mechanical advantage (pulley system) using manpower only. Various mechanical advantages can be built into these pulley systems depending on how many men are available for hauling.
2. Man-rated capstan winch with generator and power drill pulling on a mechanical advantage (pulley system). A heavy duty extension cord can be used to remove the generator fumes and noise from the operation.

Regardless of which is used, a mechanical advantage (pulley system) is built between the load (worker being lifted) and the source of power (hand haul or capstan with power). In this pulley system, the CMC MPD® is used as the progress capture for the lifting operation. This insures a safe lifting operation without the possibility of letting go or having the capstan suddenly un-spool catastrophically. The MPD® also serves as the friction appliance for gently lowering the suspended worker down to the ground when finished.

⚠ WARNING

A truck mounted, engine driven capstan winch commonly used for power line work should never be used for lifting a live human load.

A pulley system "throw" of between 10 and 30 feet is required for this task between the established butt block and the pulley system progress capture device (PCD). The CMC Rescue MPD® will be the PCD for the pulley system the ground crew will construct.

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Figure 5.2.3.F.1. Example of employees hauling on a pulley system (this one is a 5:1 "zig-zag").

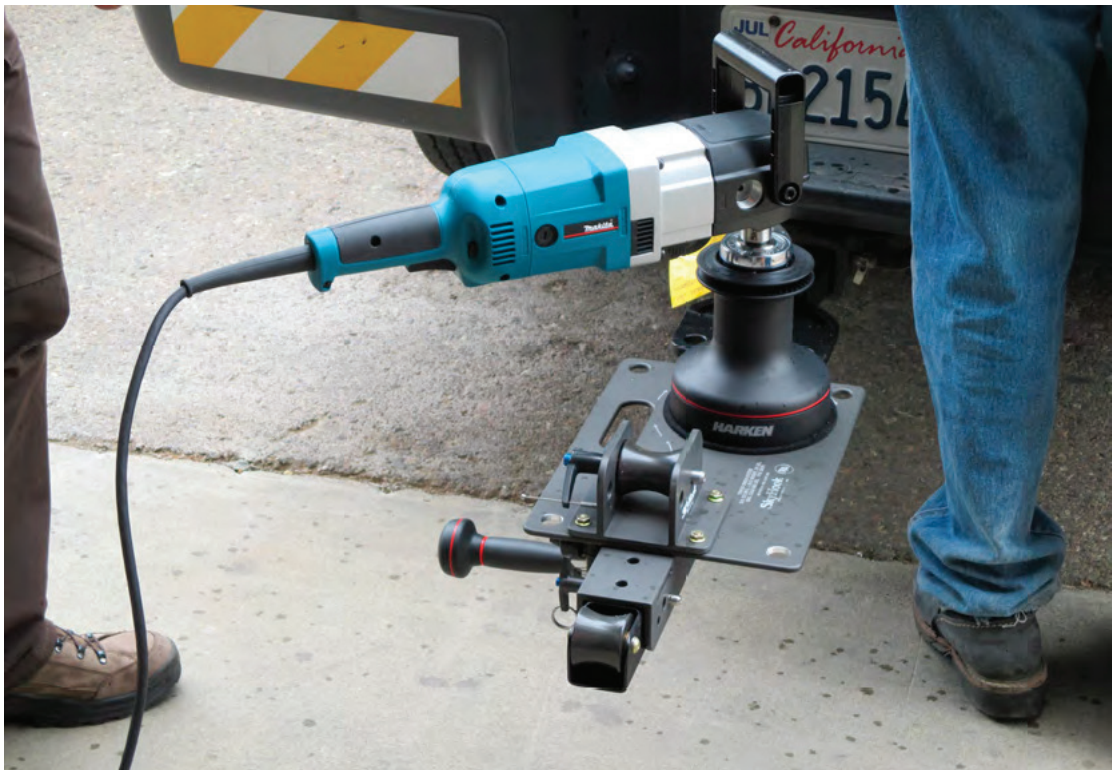

Figure 5.2.3.F.2. Photos showing the bumper mount for the Skyhook® life-rated capstan winch with Makita® 110v drill motor which has been adapted for this use. The Skyhook will require the use of generator with heavy gauge extension cord so that the noise from the generator will not inhibit communication during lifting.

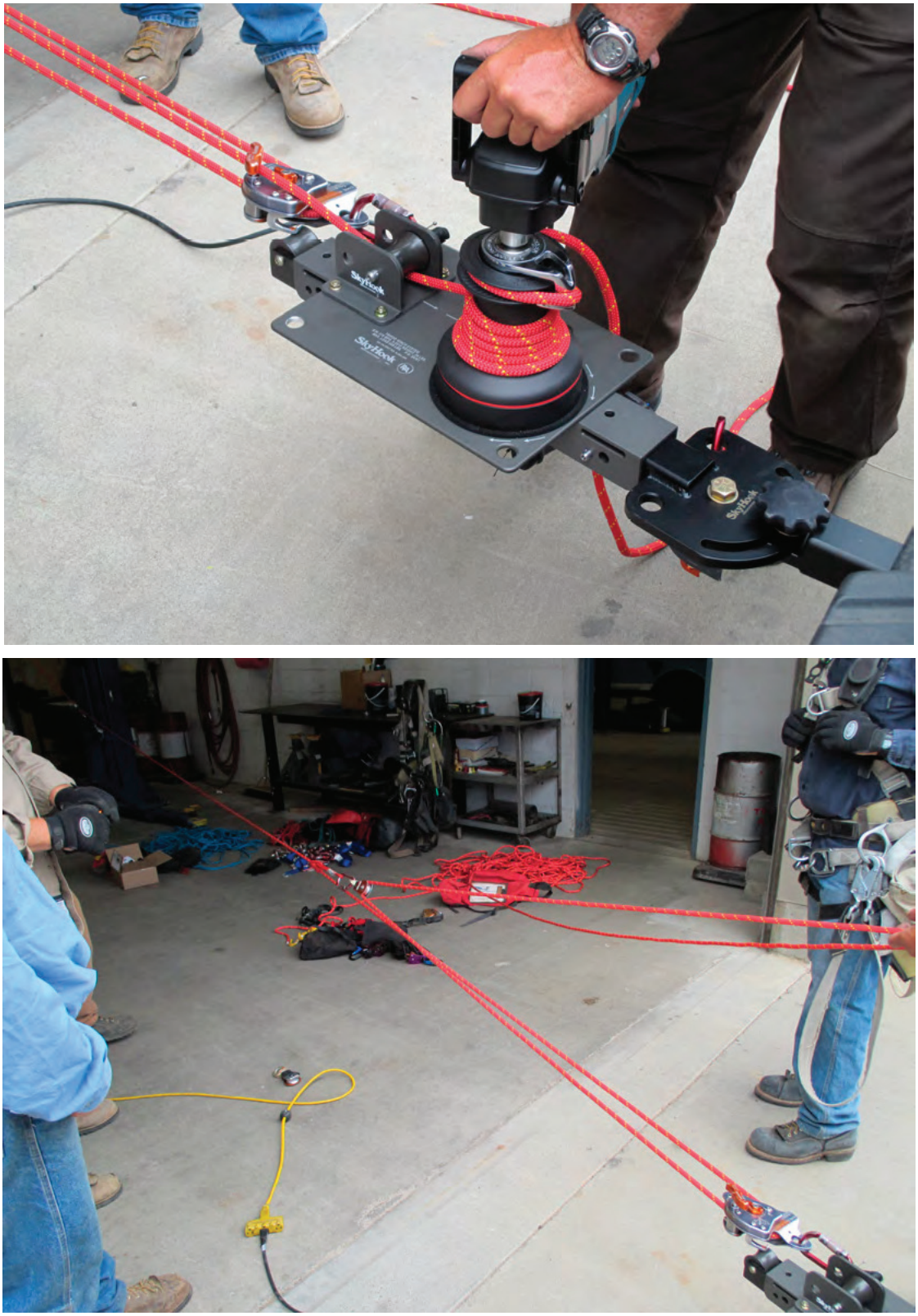

Figure 5.2.3.F.3. Photos showing the MPD® at the rear of the 3:1 "Z-rig" pulley system as the progress capture. The "throw" of the pulley system is the distance between the haul prusik with pulley and the rear MPD® (anchored on the Skyhook® bumper mount).

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Figure 5.2.3.F.4. Above, crews use the Skyhook® rear mount adaptor attached to the bumper receptacle of the crew truck.

Figure 5.2.3.F.5. The crew attached the Skyhook® capstan winch using supplied straps to the concrete footing of an HVL tower. Note the direction change directly above the winch guide roller which directs the rope into the 3:1 Z-rig pulley system with MPD® as the progress capture. Lining up all the ropes like this is important so ropes do not rub or abrade on the structure.

A 3:1 (called a "Z-rig") is generally enough mechanical advantage for the main lifting/lowering of employee, if there is enough personnel. If this is not enough mechanical advantage, a 5:1 "zig zag" or 7:1 "double-single 7" pulley system can be constructed. The higher the mechanical advantage, the longer it will take to move the employee up. Consider using the Skyhook® capstan winch for ease of lifting with low manpower.

- All "prusik haul grabs" should be three wrap for the best gripping ability.
- Varying mechanical advantages: Besides the MPD® and its anchorage and carabiner:
  1. A 3:1 Z-rig will require one additional single sheave OmniBlock®, one prusik rope grab and one carabiner.
  2. A 5:1 "zig-zag" will require two additional single sheave OmniBlocks®, two prusik rope grabs and two carabiners.
  3. A 7:1 "double-single 7" will require one additional single sheave Omni Block®, one additional double sheave Omni Block®, two prusik rope grabs and two carabiners.

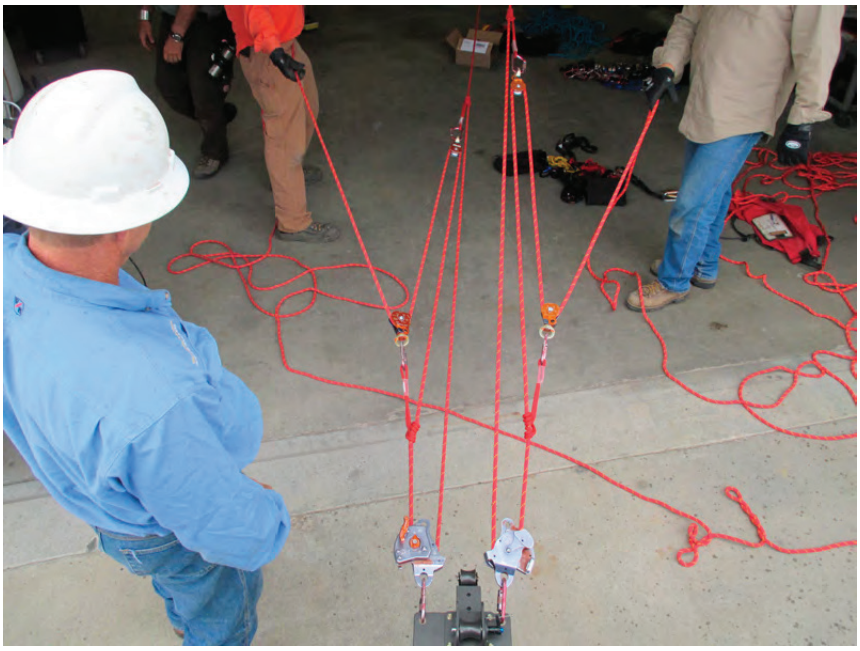

Figure 5.2.3.F.6. Crews practice building two side by side but separate 5:1 pulley systems, called a "zig-zag 5:1", using the MPD® as a progress capture. Note how none of the systems are twisted or crossed over.

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5.2.3.G PULLEY SYSTEM

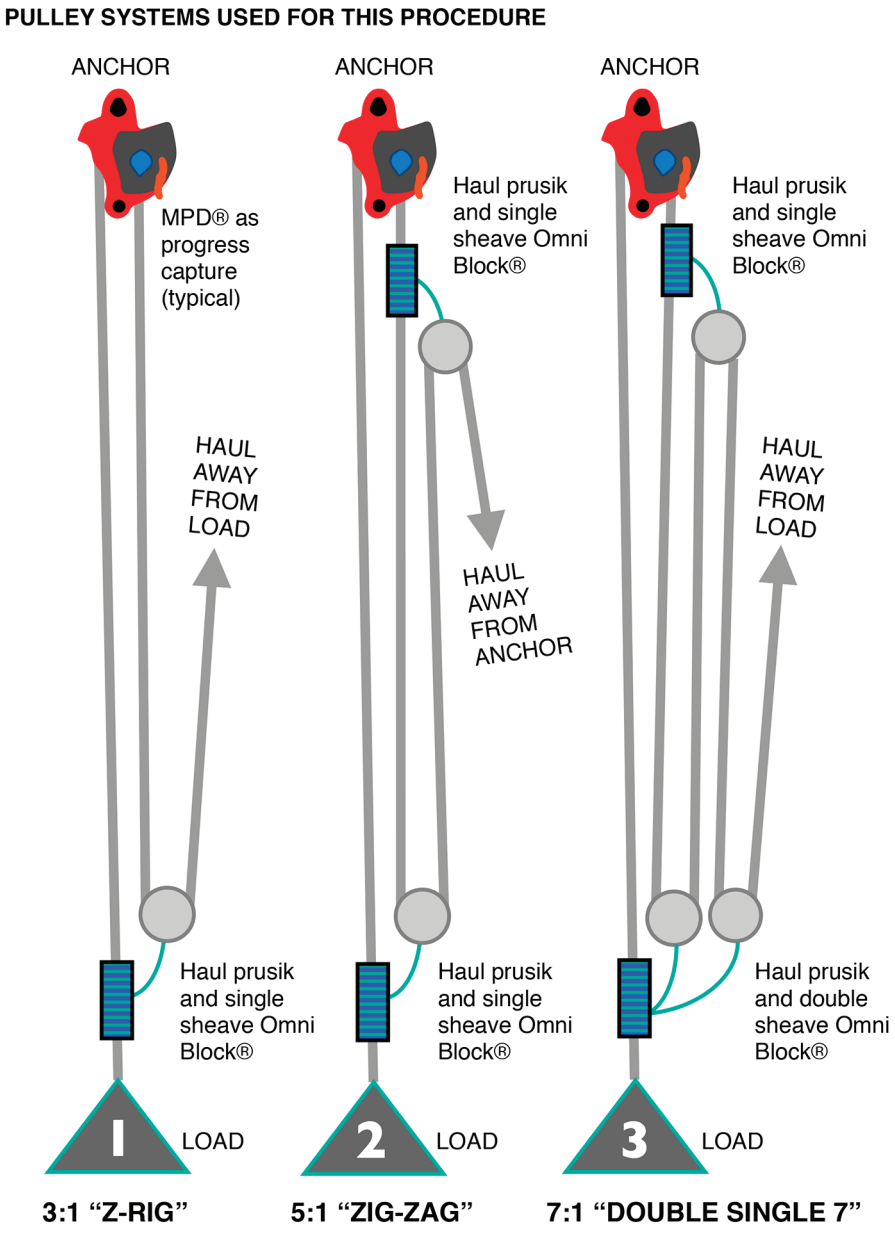

Figure 5.2.3.G. Pulley systems used for this procedure.

5.2.3.H WORKER HARNESS/SEAT

Worker lifted by harness or work seat

- A comfortable class 3 tower harness may be used if the employee suspension time is short.
- For reasons of comfort and to reduce or eliminate the possibility of harness-induced pathology (tourniquet syndrome caused by prolonged hanging in a harness), a work seat may be used for the suspended employee.
- The work seat is used in conjunction with the above mentioned harness. The Petzl Podium work seat cannot be used on its own unless it is a stand-alone Bosuns Chair.

Figure 5.2.3.H. Example of harness chair in use.

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5.2.3.1 WORKER

Suspended employee's responsibilities:

- Two ends of rope, one 250′ and the other 125′ should be waiting at the base of the down guy where the employee is readying himself for being lifted up the down guy.
- The 250′ is the main line which does the lifting/lowering of the suspended employee. It will clip to a multi-directional triangular screw link hooked on the front of the harness umbilical D ring (no carabiner). If the harness used has two D rings (like the photo) make sure both of these D rings are included into the screw link.
- The suspended employee should be aware that depending on which way they run this rope around the body to the D ring from the tower will determine which way they will hang: facing to the left or to the right. Attention to detail is needed here by the employee being lifted.

Figure 5.2.3.1.1. Example of employees preparing for ascent.

- The stainless steel 2″ Omni Block® (from CMC Rescue) is the only block that should be employed on the steel down guy. Open the sheave and apply it onto the bottommost down guy, then close it. Make sure it is locked fully closed. Attach this stainless steel Omni Block® to the same front umbilical (central) D ring that the main lifting/lowering line is attached to. There will be 2 carabiners in this umbilical D ring. Make sure they are in order on the umbilical D ring. Depending on which way the worker wants to face relative the down guy, the Omni Block® carabiner should be the lowest one (closer to the bottom of the down guy).

Figure 5.2.3.I.2. Employee is ready to be lifted up the bottom-most of three down guys. A steel 12mm tri-link was used as the multi directional connection for the saddle style harness and the CMC Stainless Steel Omni Block® on the guy. This connection is not needed with proper suspension style harness having central, sternly, dorsal, and positioning connection points. The main lifting/lowering line is attached with a carabiner to this tri-link as shown. The belay line is attached to the rear D ring. The safety belt is encompassing all three parallel lateral down guys as shown.

- The 125′ rope is the belay line and will be clipped directly to the suspended worker's posterior D ring. Ground crew can make this connection on the ground if the employee cannot reach it. This must be connected before the climber on the tower pulls up all slack in the belay line and stuffs it into the empty belay line bag.

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Figure 5.2.3.I.3. Employee on the lateral down guy for this HVD structure.

Figure 5.2.3.I.4. Employee is at the top-most internal-guy pre-form spacer. The operation now changes from lifting to lowering them, and all pulley systems can be dismantled in preparation for this.

5.2.4 FINAL SAFETY

5.2.4.A READY FOR EMPLOYEE SUSPENSION BY ROPE SYSTEM

Final safety check:

Before a rope access system is loaded, a safety check must be accomplished by all crew members involved. Generally, two sets of qualified eyes need to verify that all rigging has been done properly and safely. These two sets of eyes are:

1. The person who built the rigging. They check themselves.
2. The competent person in charge who is tasked with the safety of the entire operation. The use of binoculars to check remote rigging not reachable up on the tower is mandatory.

⚠WARNING

All crew members on the rope access maintenance team doing this work should be trained in all aspects of the rigging. In this way, each person can determine if something is correct or not and can check each others work.

⚠WARNING

If remote rigging up on the tower cannot be satisfactorily checked from the ground and guaranteed to be correct, a second qualified climber should be sent up to check and verify the rigging before the worker is suspended from the system.

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Figure 5.2.4.A. Final safety check before lifting employee.

5.2.4.B TAKE UP SLACK

Taking up slack in system – ready to lift employee:

- Make sure they have everything needed to replace or maintain internal-guy pre-form. A spare tool for removing and replacing pre-form is advised in case the first one is dropped by accident.
- Safety check has been completed. Ready to lift employee up the down guy.
- As the controller calls for taking up of all slack in preparation of lifting the employee, ground crew members may position themselves at the MPD® with hands on the free end of the rope ready to pull.
- When they call for all slack to be taken up, one or more ground crew can pull on this free end. The MPD® will serve as the PCD and every inch of rope pulled through will be held securely.
- Construct a 3:1 Z-rig pulley system between the butt block and the MPD®. All prusik haul grabs should be 3 wrap onto which a carabiner and Omni Block® will be placed for the Z-rig.
- Use haulers as required or feed fair lead of the pulley system into Skyhook® capstan winch through guide roller. Ready power drill with generator.

- As the command is given to take up in the main lifting/lowering line, stop as the employee is just off the ground a few inches and not in harms way. This will allow a brief secondary recheck of all systems, anchors, carabiners, etc. Look for cross loading, improper loading of carabiners, and other things it will be hard to correct once committed with a suspended employee.

Figure 5.2.4.B. Employee on far right is a few inches off the truck platform with a fully loaded rope system. A final check occurs at this time to make certain that all rigging is loaded properly.

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5.2.4.C BELAY ON

Belay on for main lift/lower line by the climbing employee:

- Before lifting the employee, make sure the main line belays are on.
- Ask the climber if belay is on and make sure you hear a response back that the belay is indeed on.
- This belay must be constantly monitored in and out by the climber on the tower. The belayer will mirror whatever the main line does. If it goes up, they will take up belay line through the ASAP®. If it goes down, they will feed rope into the ASAP®.

⚠WARNING

Never allow too much slack to form in the belay line as this could produce a huge shock force.

5.2.4.D LIFTING EMPLOYEES

Lifting employees aloft:

- If belay is on, and the secondary quick safety check is complete, the ground crew can lift the worker. After the worker leaves the ground, it is prudent to allow them the control of the lifting operation as they will be approaching the internal-guy pre-form connections.
- Ground crews in charge of lifting by one of two means, should slow the lift when they see the employee approaching an internal-guy pre-forms. If using the Skyhook® winch, slow the drill, or use the hand crank. Listen for whistle commands to stop and go from the employee on the guy.

⚠WARNING:

The suspended employee may be injured by the internal-guy pre-form connections when being lifted if the command for stop of slow is not heard in a timely fashion. Use good whistle communication.

⚠WARNING:

The suspended employee should refrain from placing their fingers or hands above on the bottom guy, as they may be pinched by the tracking block coming in contact with the internal-guy pre-form. Keep hands free.

Figure 5.2.4.D. Employee changing pre-form spacer and completing the required maintenance.

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5.2.4.E EMPLOYEE STOP

Employee will stop and remove all internal-guy pre-form (if they exist):

- Stopping the lifting process of the worker at precise locations where they can easily reach the internal-guy pre-form above their tracking block is crucial.
- The suspended worker should remove the internal-guy pre-form between the bottom and middle guys which will allow the tracking block to pass. The pre-from can be stowed on the harness until the return trip down to the ground from the highest position.

Figure 5.2.4.E. The employee gives hold order for a stop in the lifting operation, so they can remove the internal-guy pre-form spacer before proceeding upward.

5.2.4.F EMPLOYEE AT TOP

Employee arrives at top most internal-guy pre-form installation:

- There are several internal-guy pre-forms on each section of down guy for most HVD towers. Once at the top-most position, the ground crew can break down the pulley system and prepare for a lowering of the worker.
- All generators and sources of noise can be shut down at this point so that better communication can be attained.

Figure 5.2.4.F. Employee on the lateral down guy is now at the top-most internal-guy pre-form spacer and will not be raised any further. The pulley is now being broken down in preparation for lowering them back down. The climber(s) on the tower leg monitors the slack in the belay line for up or down.

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5.2.4.G LOWER CLIMBER

Lower climber who replaces or installs internal-guy pre-form:

- Once the suspended employee has reached their maximum height at the internal guy intersection, the pulley system between the MPD® and the butt block can be removed in preparation for lowering the worker.
- If communication is improved for the lowering (all sources of noise are shut down), verbal commands from the suspended worker can resume instead of whistle.
- The employee is lowered by a "brakeman" at the MPD® with a slow, controlled descent. The brakeman should position themselves in such a manner as to be able to visually see the worker being lowered. This will assist in slowing them down as they approach the position for the next internal-guy pre-form.

Figure 5.2.4.G.1.The all important brakeman using the MPD® should position themselves in such a way as to be able to visually see the worker above. Stopping and starting the lowering is critical and so a good communication process should be followed.

- The climber on the tower will follow the movements of the main line with the belay line within the Petzl ASAP®. Do not allow the ASAP® to lock up. If this happens by accident, stop the lowering by yelling **"STOP!"** Have the brakeman tie off the MPD® with two half hitches on a bight, and then call for a "break over" on the line between the butt block and the MPD®. This will move the employee back up the guy, thus freeing up the ASAP®. Be sure that the tracking block is not prevented from moving back up the guy by a pre-form just placed.

Figure 5.2.4.G.2. The employee will need to reinstall the internal-guy pre-form spacers between the bottom and middle parallel lateral down guys on the return back down.

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5.2.4.H WORK COMPLETE

Work complete – employee at bottom:

At the conclusion of the replacement of the internal-guy pre-form spacers, the employee will arrive at the platform or ladder where they can break down all ropes and hardware.

5.2.4.I BREAKDOWN

Breakdown:

Once the employees are on the ground, the main lifting/lowering line and its belay line can be dropped to the ground onto a clean surface without hardware attached.

⚠WARNING

Never drop life safety hardware to the ground from a tower as this could damage it. Ropes only may be dropped provided they land on a clean surface.

- Make sure everyone is aware ropes or bags are being dropped.
- Once ropes have been dropped, all anchor straps, pulleys and carabiners can be carried down by the climber.

Figure 5.2.4.I. Break down: Climber returned to the ground with the rope hanging from his harness, having elected not to drop it.

5.2.4.J INSPECTION

Inspection and record keeping:

- Inspections should be made by a competent person trained in inspection of rope access rope and equipment.
- All rope should be visually and hand inspected for any cuts, severe abrasions, or anomalies as it is re-stuffed into its rope bags.
- Life safety ropes should all be logged in a rope log book: (this should be found in the rope bag pocket and stays with the rope)
    1. Name of competent person making the log
    2. Date of use
    3. How many uses
    4. Used for what purpose - which procedure

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5. Rope identification (number)
6. Length
7. Color with tracer color
8. Rope end used (A or B)
9. Did it get wet? Dirty? Shock load? Someone accidentally drove over it? Special notes.
10. Inspection results - in service or out of service.

- Knots: Make sure each rope has a double overhand stopper knot or sewn termination in the end before it is stuffed into the bag. This knot should be at the bottom of the bag. The top end should also have a figure eight on a bight knot tied. Tails on all knots should be least 6″ long.
- Any hardware dropped by accident from the tower should be taken out of service and indicated so with black electrical or other clear marking tape around it.
- Hardware (MPD®, ASAP®, Omni Blocks® carabiners should be inspected. All gear that is dirty should be cleaned with a soft cloth.
- Prusiks should be inspected for abrasion and that their manufacturer installed shrink tubing and labeling are intact.
- Inspect harnesses used by the climbers and suspended worker. Note any wear points on critical stitching.
- Inspect helmets used for cracks, deformities, etc.
- Inspect anchor straps for cuts or abrasion from tower steel.
- Inspect work seat if used.
- Skyhook® capstan winch:
  1. Inspection after each use for lubrication (EXTREMELY IMPORTANT!)
  2. Special Skyhook® Harken grease is contained in the Peilcan Case.
  3. Inspect Skyhook® 2″ red anchor straps for cuts or abrasion from tower steel or concrete footing.
  4. Follow Skyhook® manufacturers instruction on how to lubricate the Harken winch.

⚠ WARNING

Severe damage to the internal gears of the Skyhook® capstan Harken winch can occur if not lubricated at the conclusion of each day's operation.

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