Low Angle Rescue Operations Level

Presented by: Mukilteo Fire Department

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Low Angle Rescue
Standard Operating Guideline

Low angle shall be defined as any angle that is less than vertical; or an angle or incline in which a rope or system failure would not result in the rescuer falling to his/her death or sustaining serious injury.

Personnel trained, to the Operations level, in low angle rescue may attempt to gain access to patients in low angle situations. This access will be limited to those actions necessary to stabilize and/or treat the patient. Packaging and extrication of the patient shall be done with the assistance and direction of the Technical Rescue Team.

Operations level personnel shall employ the following guidelines when faced with a low angle rescue incident:

1. Request a technical rescue response from dispatch.

2. Initiate the Incident Management System (IMS)- including the establishment of a staging area for incoming units and personnel, as well as the implementation of the passport accountability system.

3. Isolate the scene and deny entry to prevent further danger to victim(s), personnel and bystanders.

4. Gather information:

- Low angle –vs- High angle
- Number of victims
- Specific victim information
- Possible or potential injuries
- Reason for rescue situation

Location of victim(s)

Last seen or heard

Rescue –vs- recovery

Most logical access to victim(s)

5. Establish an equipment area in close proximity to the access/retrieval point.

6. Ensure that all personnel working within 5’ of the edge are secured to an anchor with a “travel-limiting device”.

7. Locate and establish a safe anchor point from which to rappel using one of the following anchors

3-bite

Multi-wrap

Anchor strap (1 or 2 carabiner method)

Direct Tie

8. Gain access to the patient utilizing an 8-plate rappel, bringing all necessary equipment to secure the patient to the mainline.
9. Safety-check all rope systems prior to loading them. Begin at the anchor point and work towards the rescuer.
10. Assist the Technical Rescue Team as directed, staying within the scope of Operations level training. Tasks to include:

    Identify and locate potential anchor points

    Acting as a haul team member

    Assist in the rigging of raising/lowering systems

11. Keep all unnecessary communications to a minimum during rescue operations.

Please note that only "life safety" rope and equipment shall be used for any low angle rescue operation.

High Angle Rescue
Standard Operating Guideline

High angle shall be defined as any angle that is vertical or near vertical; or any angle or incline in which a rope or system failure would result in the rescuer falling to his/her death or sustaining serious injury.

No attempt shall be made by operations level personnel to gain access to a victim in a high angle rescue situation.

High angle rescue shall require personnel trained to the Technician level to perform any attempts at rescue.

Operations level personnel shall employ the following guidelines when faced with a high angle rescue incident:

1. Request a technical rescue response from dispatch.

2. Initiate the Incident Management System (IMS)- including the establishment of a staging area for incoming units and personnel, as well as the implementation of the passport accountability system.

3. Isolate the scene and deny entry to prevent further danger to victim(s), personnel and bystanders.

4. Gather information:

- Low angle –vs- High angle
- Number of victims
- Specific victim information
- Possible or potential injuries
- Reason for rescue situation
- Location of victim(s)

Last seen or heard

Rescue –vs- recovery

Most logical access point to victim(s)

5. Establish an equipment area in close proximity to the access/retrieval point.

6. Ensure that all personnel working within 5’ of the edge are secured to an anchor with a “travel-limiting device”.

7. Identify and locate at least two independent and secure anchor points to be used for the mainline and belay line.

8. If possible, lower a rope to the victim only if it appears that they have a harness on and they are able to follow directions. Direct the victim to clip an already tied-in carabiner to a safe location on their harness.

9. Assist the Technical Rescue Team as directed, staying within the scope of Operations level training. Tasks to include:

- Serving as a haul team member
- Edge position
- Rope management
- Securing of rescue site
- Serving as a belayer on a single person load
- Equipment gathering and supply

10. Keep all unnecessary communications to a minimum during rescue operations.

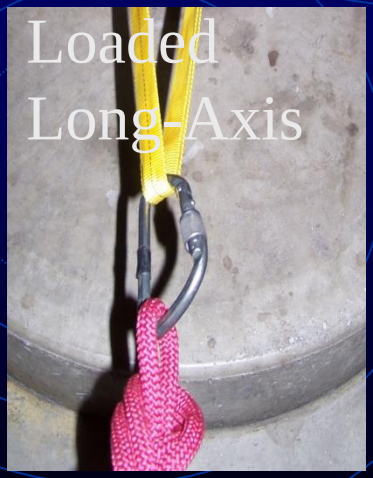
Equipment Review

Rescue Rope

- 12.5mm or ½”
- 9000lb Rated
- 200’ Length
- Meets NFPA 1983
- If inspected after each use and with proper record keeping rope may last up to 10 years
- Inspect after each use and at least bi-annually
- Correctly fill out Rope History Card after each use and Inspection
- ID Tag required on both ends of the rope

Carabiners

- 9000lb Rated
- Steel- Locking
- Use long axis only
- DO NOT side load
- If dropped from 6’ or greater remove from service and send to Station 25
- (A-shift) with an explanation – including Date, From Whom, What Happened and Unit #



Rescue 8 with Ears

- 9000lb Rated
- Aluminum or Steel
- Steel will have less friction than the aluminum
- If dropped from 6’ or greater remove from service and send to Station 25 with an explanation- including Date, From Whom, What Happened and Unit #

Seat Harness

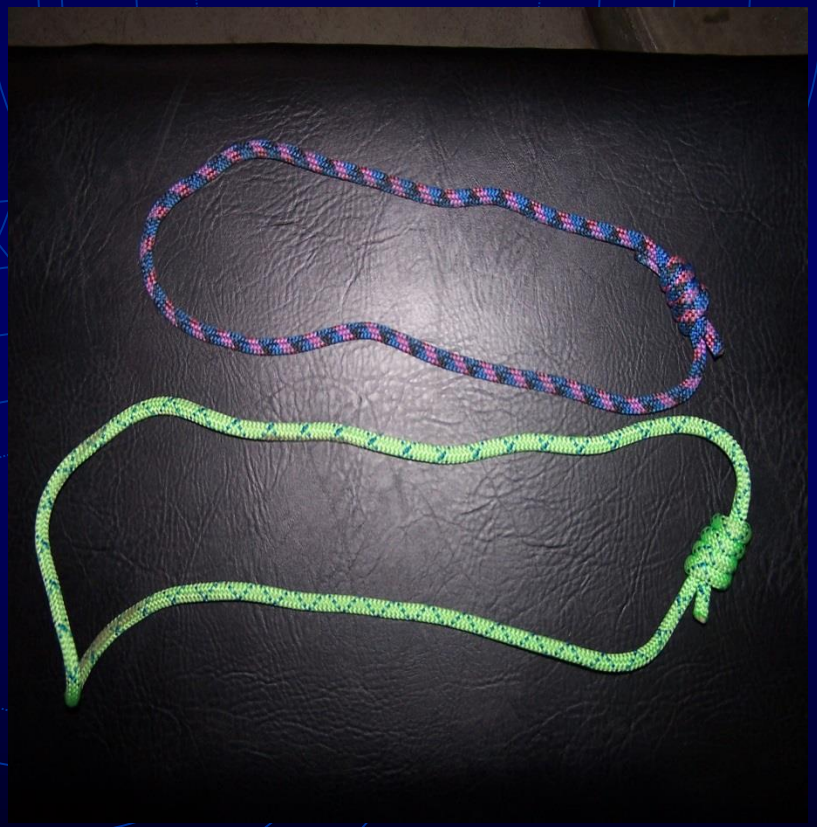
- 2” Flat Webbing- 6000lb Rated
- D-Ring 5000lb Rated
- Overall rating for harness is 5000lbs
- One Size Fits All
- Parachute type buckles- do not require back-up knots
- 10 Year Life
- NFPA 1983 Compliant
- Contrasting Stitching to Aid in Inspection
- Inspect after each use and at least bi-annually

Anchor Strap

- 1” or 2” mil spec webbing
- Minimum breaking strength of 4000lbs and maximum of 6000lbs
- Straps with D-rings are rated at 5000lbs
- 10’ Length

Prusik Loops

- Two Sizes
  - 4’5” and 5’6”
- 8mm Cord
- Breaking Strength of 3300lbs
- Joined with a Double Overhand Bend and pre-tensioned
- Do not untie prusik loops
- Used as a rope grab device for Hauling, Belaying and as an attachment to the Stokes
- When used as a 3-Wrap Prusik it will slip at 1000-1200lbs



Webbing

- Three Lengths
  - 5’- Green
  - 12’- Yellow
  - 20’- Red
- 1” Tubular Webbing
- 4000lb Rated
- Other sizes not carried on the engine company
  - 15’ – Blue
  - 25’- Black
  - 30’- Orange

Rope Bag

- Double Ended
- Ensure that rope is knotted, with Figure 8 Stopper knots, prior to stuffing
- MUST have Rope History Card attached
- Lifetime Warranty- If damaged please return to Station 25 for repair or replacement

Saddle Bag

- Used for storing rescue Software and Hardware
- Please remove from Rope Bag prior to opening pouches
- Same Lifetime Warranty applies

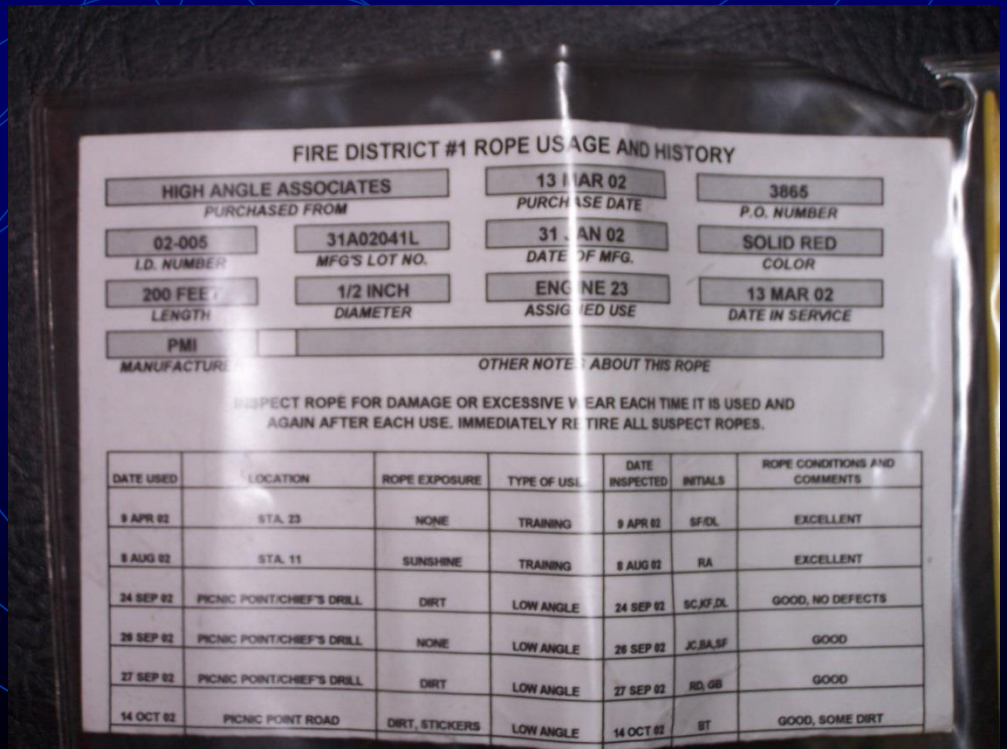
Edge Protection

- Used to prevent damage to rope
- Protects rope where it moves over an edge
- Two styles
  - Rope Sleeve
  - Canvas

Miscellaneous Equipment

Rope Rescue Gloves

Rope History Card



FIRE DISTRICT #1 ROPE USAGE AND HISTORY

HIGH ANGLE ASSOCIATES (PURCHASED FROM)		13 MAR 02 (PURCHASE DATE)	3865 (P.O. NUMBER)
02-005 (I.D. NUMBER)	31A02041L (MFG'S LOT NO.)	31 JAN 02 (DATE OF MFG.)	SOLID RED (COLOR)
200 FEET (LENGTH)	1/2 INCH (DIAMETER)	ENGINE 23 (ASSIGNED USE)	13 MAR 02 (DATE IN SERVICE)
PMI (MANUFACTURER)		OTHER NOTES ABOUT THIS ROPE	

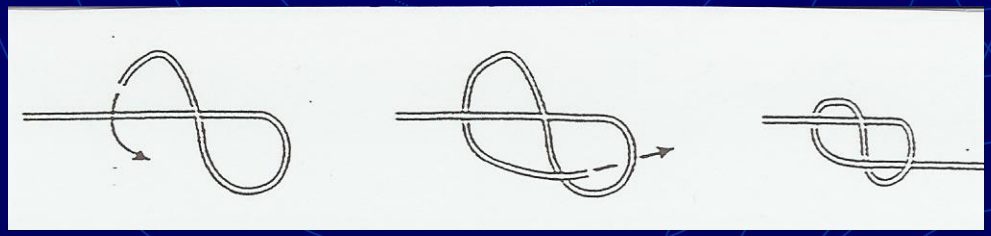
INSPECT ROPE FOR DAMAGE OR EXCESSIVE WEAR EACH TIME IT IS USED AND AGAIN AFTER EACH USE. IMMEDIATELY RETIRE ALL SUSPECT ROPES.

DATE USED	LOCATION	ROPE EXPOSURE	TYPE OF USE	DATE INSPECTED	INITIALS	ROPE CONDITIONS AND COMMENTS
9 APR 02	STA. 23	NONE	TRAINING	9 APR 02	SF/DL	EXCELLENT
8 AUG 02	STA. 11	SUNSHINE	TRAINING	8 AUG 02	RA	EXCELLENT
24 SEP 02	PICNIC POINT/CHIEF'S DRILL	DIRT	LOW ANGLE	24 SEP 02	SC,KF,DL	GOOD, NO DEFECTS
26 SEP 02	PICNIC POINT/CHIEF'S DRILL	NONE	LOW ANGLE	26 SEP 02	JC,BA,SF	GOOD
27 SEP 02	PICNIC POINT/CHIEF'S DRILL	DIRT	LOW ANGLE	27 SEP 02	RD, GB	GOOD
14 OCT 02	PICNIC POINT ROAD	DIRT, STICKERS	LOW ANGLE	14 OCT 02	ST	GOOD, SOME DIRT

Skills Review

Knots and Bends

Please tie a Figure 8 Stopper Knot



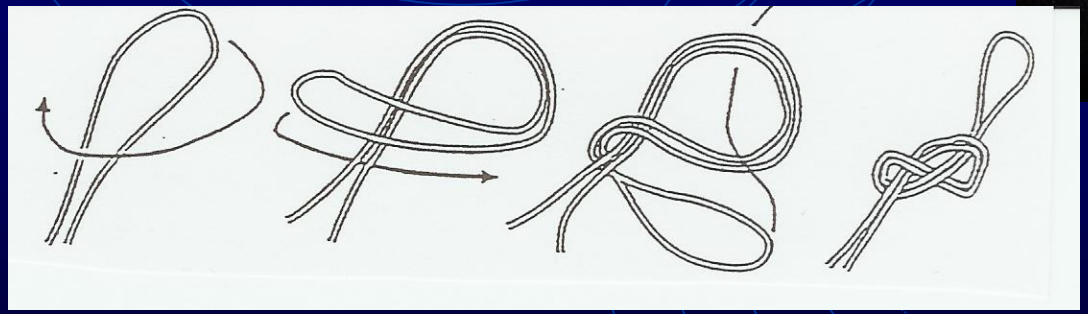
Knots and Bends

Please tie a Figure 8 Follow Through

Please note that a Safety Back-Up is NOT required when tying the Figure 8 Family of Knots

Knots and Bends

Now a Figure 8 on a Bight



Knots and Bends

The Bowline

- While this knot is not taught at the Operations level- If you are a “Bowline” person it is allowed
- Please note that a Safety Back-up <u>is</u> required on the Bowline

Knots and Bends

The Waterbend

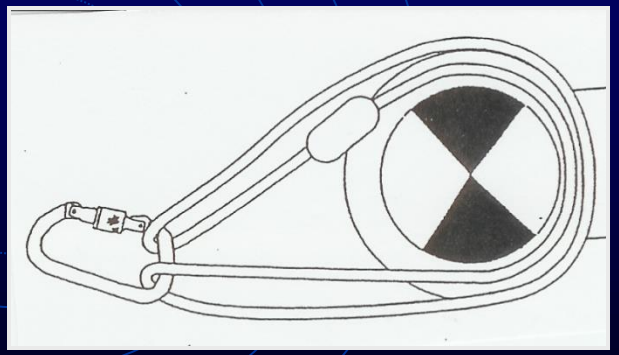
Please note that a Safety Back-up is not required when the tails are at least a palms width in length

Begin by forming an overhand bend in one end of the webbing then, with the opposite end of the webbing follow through your overhand bend so that when finished the two ends are opposite from each other

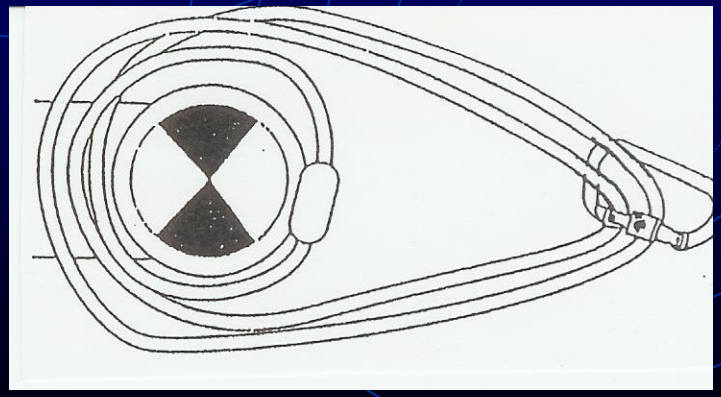
Anchors

The 3-Bight

- Begin with a length of webbing and tie a waterbend into it
- Next, wrap your anchor, ensuring that your knot/bend is running up one of the sides and place a carabiner through the two looped ends



Anchors



Multi-Wrap (Wrap 3- Pull 2)

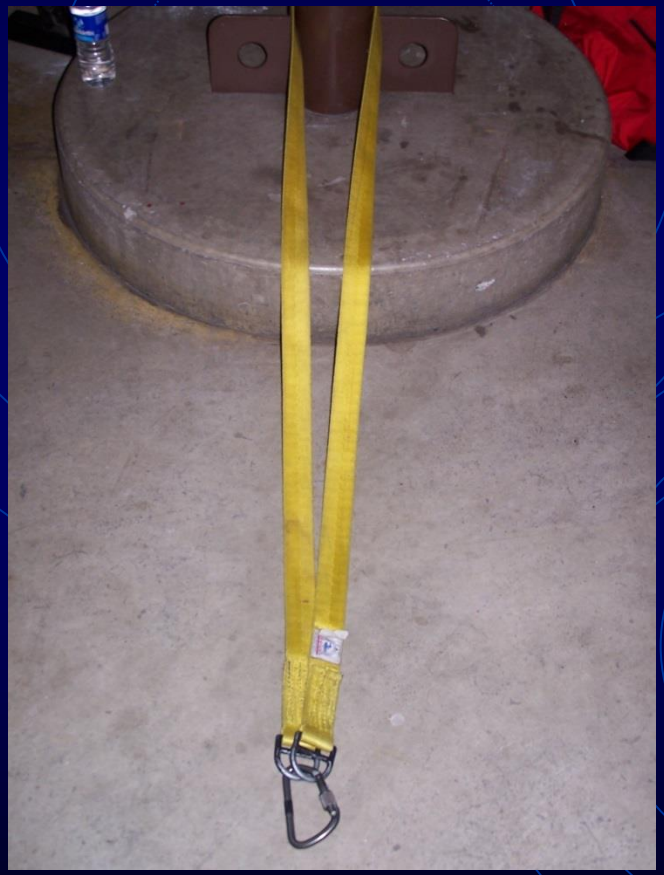
- Using webbing, wrap your anchor three times
- Tie a waterbend to join the ends
- Pull the two pieces of webbing away from the anchor, ensuring that your watrerbend is located on the load side of the anchor to reduce the force on the knot and aid in untying later.

Anchors

The Direct Tie-In

- Tie the beginning step of your Figure 8 Follow Through before wrapping your anchor
- Wrap the anchor
- Complete your Figure 8 Follow Through Knot
- Again,the Bowline is allowed if tied correctly

Anchors



Anchor Strap

- 1 Carabiner Method
  - Wrap your anchor and connect the two ends, with or without D-rings, using a carabiner
  - Ensure that the angle created by the two sides of the webbing is less than 45 degrees
  - If greater than 45 degrees use the 2 Carabiner method

Anchors

Anchor Strap

- 2 Carabiner Method
  - Use the same process as described in the 1 Carabiner method
  - Once connected, with a carabiner, simply slide the strap to one side and place a second carabiner into the system to act as your attachment point for the rope

Rescue 8 with Ears

Rigging

Run a bight of rope up and through the back of the 8-Plate. Ensure that the “running” end of the rope is on your Right if you are Right handed; and to the Left if you are Left handed

Pull the bight around the bottom of the 8-Plate

Attach the 8-Plate to your Carabiner, ensuring that you lock the gate.

Rescue 8 with Ears

Rappelling

Pictured is the “maximum friction” position. In this case a “R” handed person on rappel has his “R” hand behind him and on his hip. The left hand is placed under the 8-Plate, to aid in braking and rope control.

To reduce the friction, and increase the speed of descent, while on rappel simply move the brake hand away from the body. For “R” handed rappel your hand would come off the hip, out and forward simultaneously

Rescue 8 with Ears

- Lock-Off Tie-Off
  - In most instances the Low Angle rescuer should be able to remove him/herself from the line once they have reached the patient. If due to angle, slope or other concerns you must remain attached to the mainline you must use the lock-off tie-off as a means of securing yourself to the line and ensuring that you will remain at the necessary point on the line to perform your work
  - Directions are for “R” handed rappel
    - Once stopped,move the “L” hand over to the running portion of the rope; to act as a brake
    - Now move your “R” hand forward and in front of the “L” hand, grabbing the running portion of the rope

Rescue 8 with Ears

Lock-Off Tie-Off

- Now, return your “L” hand to the 8-Plate and with an underhand grip grab the 8-plate, squeeze the rope running around the bottom and rotate the 8-plate to the “R”
- At this time bring your “R” hand forward, with the rope, wrapping it around the back of the 8-plate and capturing the standing portion of the line- Pull back towards your body once the standing line has been captured

Rescue 8 with Ears

Lock-Off Tie-Off

- Repeat the previous step so that you end up with two complete wraps that have captured the standing portion of the rope
- Now pull up a length of rope, from the running end, form a bight and feed it through the bottom of the 8-plate
- Finish by tying an overhand safety to the standing portion of the line
- You are now locked-off and tied-off

3- Wrap Prusik

Begin by placing the knot of the prusik loop onto the rope. Wrap the prusik onto the rope three times, then pull off-center so that your knot ends up running up one of the sides, as shown

The Emergency or Hasty Harness

This harness may be tied using either red (20’) or yellow (12’) webbing. The yellow webbing allows the harness to be completed with a carabiner only, while the red webbing requires a square knot and a safety back-up to complete.

Please note that the yellow webbing may not fit all individuals while the red should be long enough for most all sizes of people

The Emergency or Hasty Harness

To tie the harness:

- Tie a water bend into a length of webbing and place the knot in the “small” of the victim’s back- creating a “3-bight” around the victim (1)
- Allowing the bottom loop to hang down behind the victim, reach between their legs and bring the loop forward to a point even with the “3-bight” loops in your hand (2)

The Emergency or Hasty Harness

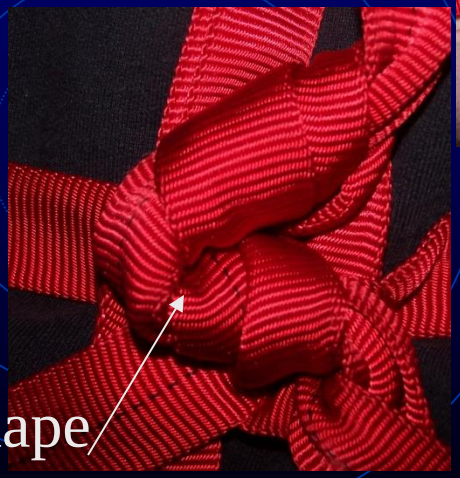
- Once even with your front loops reach in from the outsides and grab the loop that is now running through the victim's legs (3)
- Begin to pull tension on the webbing, by pulling from the bottom of the loops (4), until snug against the victim's waist (5)

The Emergency or Hasty Harness

- At this time, if you have used the yellow webbing, you may simply connect the loops with a carabiner to complete your emergency harness (6). (Red webbing users will need to tie off their excess webbing with a square knot and safety back-up)
- The square knot is formed by tying two overhand knots in a specific order. Begin by placing the piece of webbing in your “L” hand over the piece in your “R” hand (6a) and tying an overhand knot (6b)

The Emergency or Hasty Harness

- Now, take the piece of webbing in your “R” hand and place it over the top of the piece in your “L” hand (7a) and tie the second overhand (7b).
- The subsequent tightening of the knot should result in the formation of a “V” shape; thus letting you know that the knot has been tied correctly



The Emergency or Hasty Harness

- Complete your, red, webbing harness by tying a safety back-up on either side of your square knot and placing a carabiner around the square knot. (8)

Internal/External Lash

- The Internal lash (yellow webbing) is meant to keep the patient from sliding up or down while in the Stokes basket.
- The External lash (orange webbing) is intended to secure the patient into the Stokes basket

Internal/External Lash

The Internal Lash

- Once the victim has been placed into the Stokes basket, with an emergency harness in place, begin the internal lash by girth hitching a length of yellow webbing around the carabiner and running the ends towards the victim's head
- Tie the loose ends around the vertical posts of the basket, above the level of the head, using a round turn and two half-hitches

Internal/External Lash

The Internal Lash

- Once both sides of the head of the basket have been tied, girth hitch a second length of webbing around the first and run towards the foot of the basket
- Again tie off around the vertical posts, near the knees of the victim, using a round turn and two half-hitches

Internal/External Lash

The Internal Lash

- The completed Internal Lash

Internal/External Lash

The External Lash

- Using a length of Orange webbing, supplied by the Technical Rescue Team, find the center of the length and place it on the victim's chest.
- Begin to run the ends around the vertical posts and cross ends over the victim's body forming an "X" at each cross

Internal/External Lash

The External Lash

- Once you have reached the victim's feet tie-off one end of the webbing using a round turn and two half-hitches
- Tension the webbing beginning at the secured end and working yourself to the running end
- Once all of the slack has been removed from the system secure the remaining end with a round turn and two half-hitches.

Internal/External Lash

The External Lash

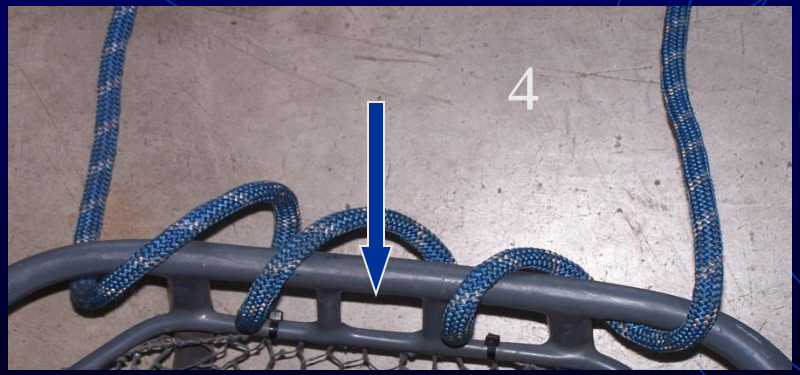
- The completed Internal/External Lash

Securing the Mainline to the Stokes

Once the patient has been secured, using the internal/external lash, the stokes basket must be secured to the mainline. To do this you must:

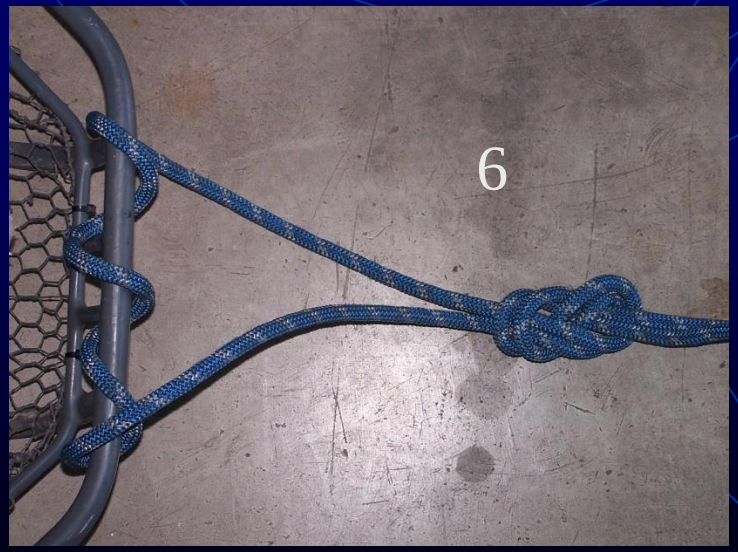
1. Begin by tying a figure 8 up from the end of the line
2. Wrap the mainline over the top of the bar, at the head of the basket

Securing the Mainline to the Stokes



3. Continue to wrap as you move across the head of the basket. Wrapping over the top of the bar to form multiple loops around the head of the basket; ensuring that you **DO NOT** wrap around the area at the center of the basket. (See photo 4)

Securing the Mainline to the Stokes



5. Once all loops have been completed, across the head of the basket, complete the tie-off by performing a follow through of the figure-8 that you had used to begin with. (See photo 6)

Please note that the line being used is the same line that the rescuer had used to access the patient.

Practical Application

Upon completion of this presentation please assemble your Engine Company Rope Bag and practice the following skills:

- Knots and Bends
  - Figure-8
  - Figure-8 Follow Through
  - Figure-8 on a Bight
  - Bowline
  - Waterbend
- Anchors
  - 3-Bight
  - Multi-Wrap (Wrap 3 Pull 2)
  - Direct Tie-In
  - Anchor Strap (1 and 2 Crabiner Methods)
- Rappelling
  - 8-Plate
    - Rigging
    - Rappeling
    - Lock-Off Tie-Off
  - Prusik
    - 3-Wrap Prusik
- Emergency or Hasty Harness
  - Use both Red and Yellow webbing
  - Tie onto yourself and to a crew member

Contact your shift's Rescue Tech if you need assistance.