Loveland Fire Rescue Authority
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SWIFTWATER RESCUE – SWIMMER OPERATIONS (1.1)

Developed by Engineer Randy Kolb
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TASK SKILL DESCRIPTION AND DETAIL

Rescues involving floods and moving water can be some of the most challenging and unpredictable environments encountered by firefighters. Rising water can overrun the local drainage systems resulting in multiple water rescue situations. Rescuers without proper training and equipment can quickly become overwhelmed due to the rapidly evolving nature of these incidents. Local municipalities could be held liable for fire department crews operating a scene without proper training and equipment. Preparation for these events begins far in advance of the inclement weather.

Section 1: Swiftwater

- One of the most dynamic and dangerous areas of Special Operations
- Difficult to train for the real thing
- Our goal
  - Knowledge
  - Skills
  - Come home safe

Safety Considerations

- Set upstream and downstream safety on both sides, if possible for all operations.
- All crew members shall wear proper PPE at all times while in the warm or hot zone.
- Determine appropriate thermal protection based on water temperature.
- Consider additional equipment needs.
- Priorities
- Self rescue
- Rescue of Crew
- Rescue of victim
- Do not wear turnouts or fire helmets next to the body of swiftwater
- Never put feet down if swept away as there is potential for foot entrapment
- Never tie a rope around a rescuer not wearing a quick release mechanism.
- Assess all hazards upstream and downstream of the rescue.

- Never tie a line across the water at a right angle.
- Always work on the upstream side of rope when working from shore.
- Upstream Sector observes for hazards floating downstream and for water level changes
- Downstream Sector prepares to rescue victims swept downstream with throw bags.
- Always communicate with command and other rescue crews all changes involving hazards or location of victim and rescuers.

Swiftwater Hazards

- Debris
  - Top/floating debris
  - Suspended debris
  - Bottom debris
- Fixed obstacles
  - Rocks, bridge abutments
- Strainers
  - Barb wire, tree limbs, branches, log jams, fences
- Low head dams

Rescue Philosophy

- Always consider the risk/benefit analysis of every operation
- We Will Do Our Best to Save Savable Lives
- Remember We Did Not Put That Person at Risk
- We Owe It to Ourselves and Our Families to Come Home Safe

Section 2: Characteristics of Swiftwater

Powerful

- Water Weighs 62 Pounds Per Cubic Foot
- Mass Obeys the Laws of Physics
- Moving Water Has Tremendous Energy

Relentless

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- Unlike the Surf, the Force of Swift Water Does Not Let up
- We Have Very Little Control Over the River
- If You Are Trapped or Pinned You Have a Very Poor Chance of Survival

Predictable

- A knowledgeable rescuer will be able to read the river and predict with certainty where both safety and danger lie

Section 3: FORCE ~ VELOCITY

Current Velocity (mph)	Force On Legs (lbf)	Force On Body (lbf)	Swamped Boat (lbf)
3	16.80	33.60	168.00
6	67.20	134.00	672.00
9	151.00	302.00	1512.00
12	269.00	538.00	2688.00

Figure 3.1 Force and velocity

- Rule of thumb: Stay out of current over your knees

Determine Velocity

- Measure the time it takes an object to float 100 feet

Seconds	Current	Speed	
	ft. per sec.	M.P.H.	Knots
5	20	13.6	12
10	10	6.8	6
15	6.7	4.56	4
20	5	3.4	3
25	4	2.72	2.4
50	2	1.36	1.2
100	1	0.68	0.6

Figure 3.3 Speed of water

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Velocity influenced By…

- Gradient (steepness)
- Friction
- Volume (CFS)
- Channel Configuration
  - Bends
  - Constrictions
  - Obstructions

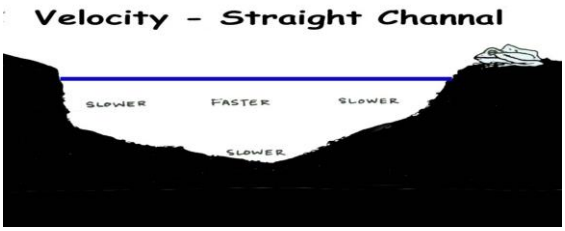

Figure 3.2 Velocity in a straight channel of moving water

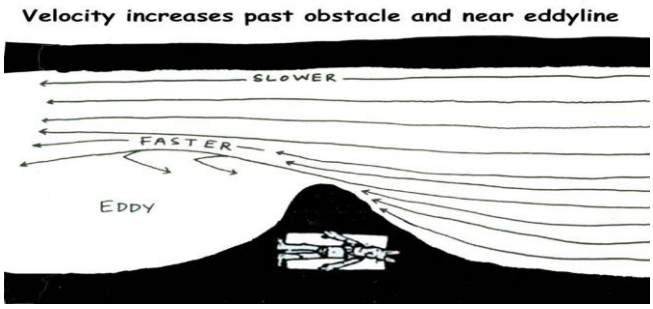

Figure 3.3 Velocity increases

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Section 4: River Terminology

- Our reference point will always be facing down river
    - River Left or River Right
    - Up River or Down River

Figure 4.1 River Terminology

Section 5: Personal Protective Equipment for Shore Based Rescuers

- Always wear a PFD (equipped with whistle & knife) in and near the water
- Wear proper environmental protection
- Have appropriate foot protection
- Leather gloves for rope management
- Helmet (when necessary)
- Multiple throwline bags.

Section 6: Rescue Objectives

- Locate
- Contact
- Assess
- Stabilize
- Prepare for extrication
- Extricate
- Transport to medical facility

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Section 7: Effecting a Rescue

- **Low Risk To High Risk**
    - REACH
    - THROW
    - ROW
    - GO

Reach

- Simple technique used when the victim is close to shore
- Makes use of any object that can be extended to the victim for them to hold
- Victim must be able to assist in rescue by holding on to object extended to them
- Maintains high degree of safety for rescuer (do not get pulled in)

Throw

- Throw method is used when distance to victim exceeds ability to use the reach method
- Method limited by distance and throwing accuracy of the rescuer
- Victim must be able to assist in rescue by holding on to object thrown to them
- Still maintains high degree of safety for rescuer

Throw Bag (Figure 5.9)

- Approximately 50 Foot Effective Range
- Victim Must Be Physically and Mentally Capable of Grabbing and Hanging Onto Line
- Line Must Land “at” or “up River” From the Victim

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Pendulum Rescue

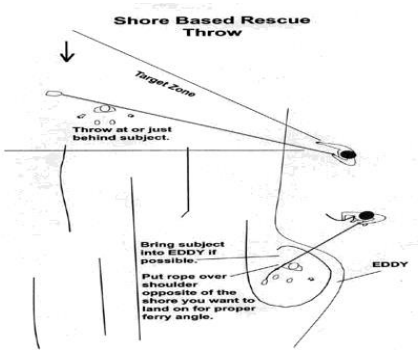

Figure 6.1 Pendulum Rescue

2ND Person Assists swimmer to shore (rope on far shoulder)

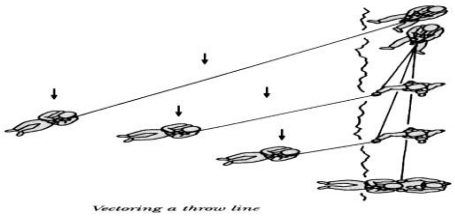

Figure 6.2 Pendulum Rescue with two rescuer

Receiver Position (rope on far shoulder)

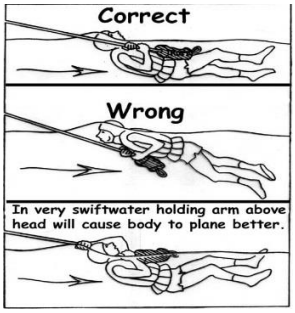

Figure 6.3 Receiver Position

Proper Ferry Angle

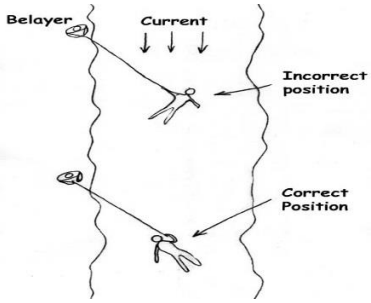

Figure 6.4 Proper Ferry Angle

Snag Plate with Throw Bag

- Allows the user to snag and pull in a rope with a standard throw bag. Once installed in the bag, it will always be ready when needed.
- Once the rope is snagged and pulled back to shore, victim is wrapped by throw bag rope

Figure 6.5 Snag Plate

Row

- See Boats Operation Training Manual – Swiftwater

GO WARNING – HIGH RISK !

- Tension diagonal crossing (zip-line)
- Tethered Swimmer – "live bait" rescue
- Shallow water crossing

Caution: Rescuers can be swept away

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Tension Diagonal Crossing

- Tensioned line at an angle across river
- Rescuer is attached to the line and ferry's to victim
- Rescuer and victim ferry to other shoreline

Tethered Swimmer (Live Bait)

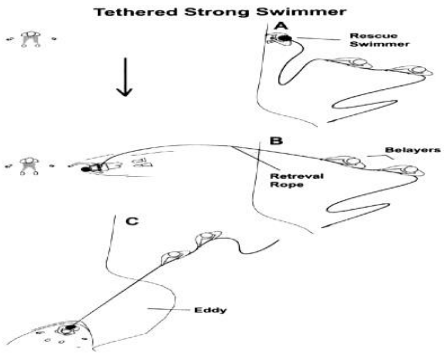

Figure 6.6 Tethered Swimmer

Shallow Water Crossing

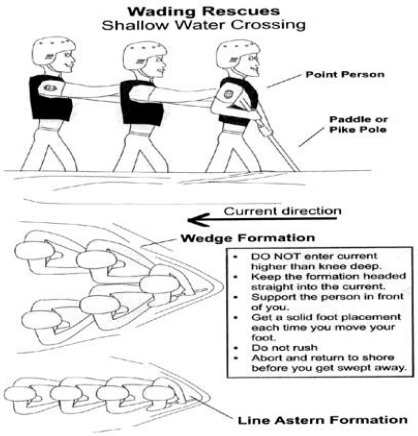

Figure 6.7 Shallow Water Crossing

Section 8: Signals

Rescue Hand Signals

- Used where verbal communication is not effective
- Team Leader
- Select good vantage point for all involved to see
- Use whistle

Stop (blow one long blast on whistle)

Figure 8.1 Stop

OK signal (touch the top of head with a deliberate motion)

Figure 8.2 OK

Help-Emergency (give three long blasts on whistle and wave paddle or helmet)

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Figure 8.3 Help

Direction (point and hold indicating proper direction)

Figure 8.4 Direction

Task Skills Instructional Requirements and Implementation

- Associated PPE required for instruction the tasks
- Primary progression steps for the development of the tasks
- Evaluation criteria for observing, knowledge, skills and abilities
- Safety criteria when instructing these tasks

REFERENCE INFORMATION

- NFPA 1006 Level I Technical Rescuer
- NFPA 1006 Level II Technical rescuer
- Dive Rescue International