Technical rope rescue
in an urban environment

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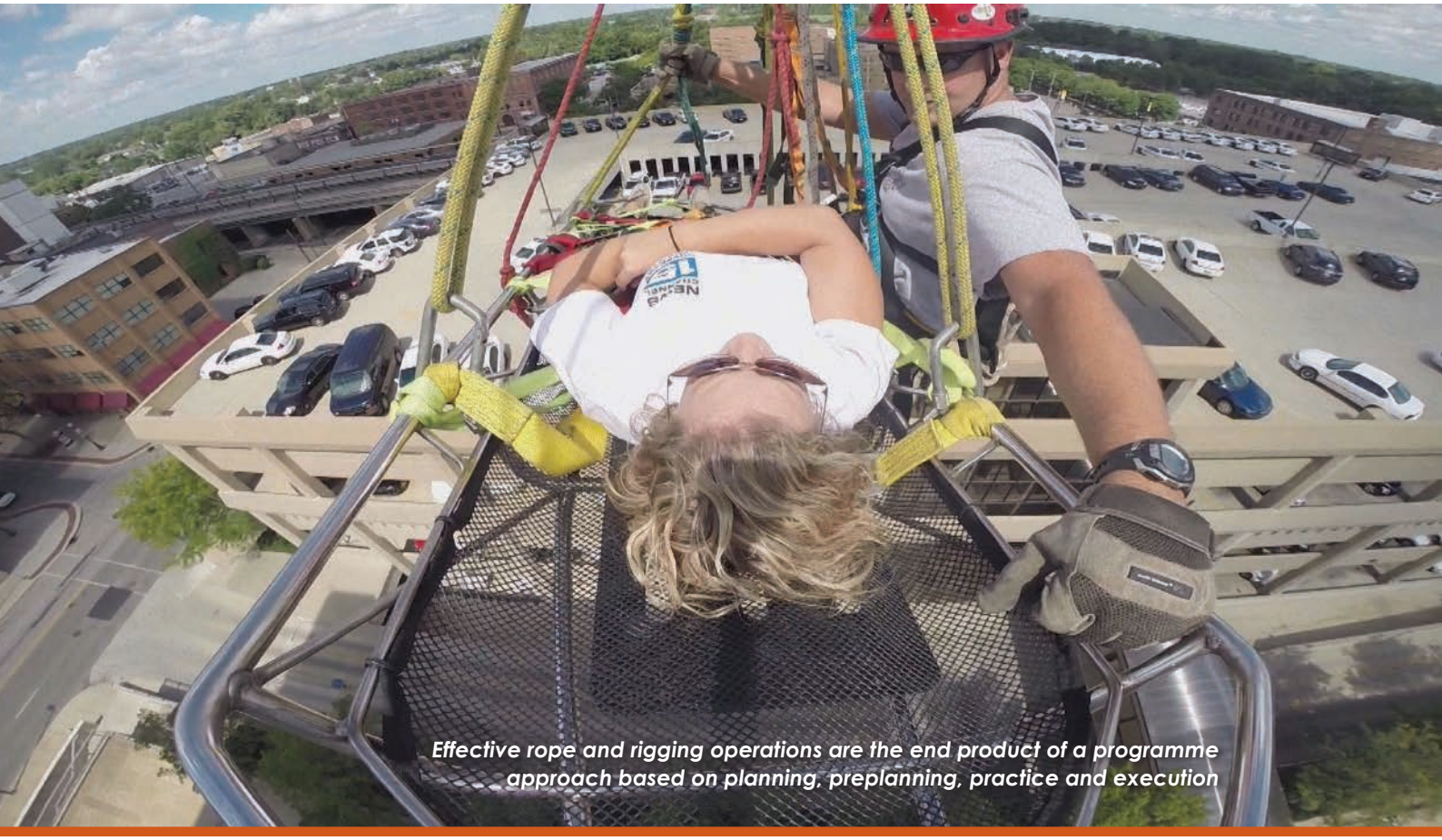

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On any weekend or holiday in many parts of the country, you are sure to find several people taking advantage of the numerous opportunities offered by the fine weather and great outdoors. People hiking, rock climbing, boating and participating in a number of other activities that could place them at risk of injuries caused by falling or themselves being struck by falling objects. When these injuries occur, it is usually far from any definitive medical care and in many cases these victims end up in locations that can only be reached from a position above them. The only way this can be achieved is by means of a rescuer descending by rescue rope and the only method they can be removed is to raise them up the same way they came down.

We are very fortunate in this country to have some of the best volunteer mountain search and rescue teams in the world. Organisations such as the Mountain Club of South Africa, the Off Road Rescue Unit (ORRU) and K9 Search and Rescue associations generally have an excellent working relationship and do a lot of planning and exercising in the wilderness environment. In many cases they have access to medical rescue aerial resources, which provides a huge advantage in the event of a wilderness search and rescue operation. We have, on occasions, witnessed these organisations assist city-based emergency services conduct high-angle rescue missions in the urban environment but mostly it is up to that emergency service to respond to and rescue victims using their own resources and expertise.

Incidents requiring advanced rope rescue response can happen anywhere and at any time. Many of you, I'm sure will recall a particularly challenging rope rescue done at an amusement park in Cape Town in 2005. When you consider the many height-related risks in an urban environment, you will have to include scaffolds, communication towers, tower cranes, bridges, high-rise buildings and transportation systems such as elevated motorways, to name a few. In certain parts of the country you will also encounter abandoned mine shafts and often you might also find that large informal settlements have arisen around these unprotected shafts. Although they might not be in any inner city areas, manufacturing and bulk storage sites will provide their own risks.

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In order to better illustrate the challenges of rope rescue operations in the urban environment, I have included two informal reports of rope rescue operations that have taken place in this country some years back. Firstly, I asked highly regarded rope rescue expert, Dion Tromp, from High Angle Rescue and Access, to give us his thoughts on the rescue of 16 people trapped on a rollercoaster in Cape Town in January 2005. I also included a highly entertaining account by the legendary rescue instructor, Jim Gargan, of a rescue operation that took place in the Angelo Informal Settlement in Boksburg, Ekurhuleni, in the late nineties.

So what's the difference?

Apart from the obvious (terrain), there are a number of differences between rope rescue missions in the wilderness and the urban environment. In a city you will certainly be closer to a medical facility; you should have better access to on-scene intelligence and generally have access to more resources. On the other hand, a rescue mission in an urban environment could present additional risks such as the presence of hazardous materials, structural entrapment and confined spaces, not that you won't find confined spaces in the wilderness environment as witnessed during a rescue operation near Rustenburg in the North West Province in September 2014. It might require the responding team to use additional equipment not normally related to rope rescue such as tripods, ventilation equipment, gas detectors and an array of other hazardous materials (hazmat) equipment.

Another, crucial, difference you will most likely encounter is that in a wilderness search and rescue (WSAR) incident, virtually all responders are dedicated WSAR practitioners and all their systems are designed and rigged for their environment. In an urban situation you will have a number of responders on scene and if you, as an emergency service, have not taken the trouble to train and equip your team specifically, you might find a diverse number of skills that need to be moulded into an effective rescue team.

My question to emergency services managers is, "Do you appreciate the height hazard posed by your area of responsibility and are you able to respond effectively when it's necessary or do you merely send your staff on the arbitrary rescue course when it comes around and hope that they will do everything right on the big day?"

Successful technical rope rescues do not just happen. Effective rope and rigging operations are the end product of a programme approach based on planning, preplanning, practice and execution.

Be prepared

Any preplanning exercise must start with clear objectives. It is impossible to inspect every site in your jurisdiction with a high-angle risk. The best you can do is to develop a general picture of what you could encounter and at least visit the most likely risk sites, which could then serve as a good indicator for your planning.

A lot of your preplanning will focus on the general aspects that should be present at each incident. This will include rope system construction, apparatus and equipment placement such as anchor points and personnel assignments along the system.

These actions then become part of your standard operating procedures (SOPs), which should be put in place upon arrival by the first-in units, after the safety assessment. This will then allow the incident commander (IC) and rescue sector leader with a continuum of predeterminations that will enable them to focus on the incident specific challenges and respond to any variables.

One thing I realised at a very early stage of my career is that there is a plethora of good rope rescue training institutions in the country that provide excellent technical rope rescue training. Many times I wish this was prevalent in other disciplines as well. Sending your staff on a course is the starting point but training should be continuous and skills must be kept sharp through ongoing in-service training and exercise. Improvisation during a rescue operation is fine only if it falls within the capacity of the equipment utilised and the system being used. To be able to safely improvise at the scene takes countless hours of training and familiarity with the equipment.

Your crew staffing requirements will almost never equal your crew staffing availability. This will necessitate the use of untrained personnel to assist in tasks such as raising, you always have guys that are not very clever but are able to lift heavy things and belay as well as helping to get a stretcher over the edge. It goes without saying

Manufacturing and bulk storage sites provide their own risks

- that you will, however, always need a strong contingent of technical rope specialists.

Although the command system for a confined area high-angle rescue incident will be limited, it is important to identify the key staffing positions and assignments. Span-of-control considerations should include these positions and included in your standard operating procedures. A lot of crew management will be required to ensure that all technical aspects of the rescue are covered. Also identify sufficient back-up personnel for the raising and lowering operations. I have found that having a medic such as an emergency doctor, paramedic or emergency medical technician (EMT) at each station is extremely helpful for the following reasons:

1. The first team to reach the victim can do an initial assessment and perform any priority emergency medical care
2. A medical responder preparing the stretcher will have an appreciation of the type of system required for the injuries suffered by the victim and prepare the stretcher and its rigging accordingly
3. The patient reception area can be adequately prepared
4. Communication by the medical sector to the receiving trauma unit will be more effective

Although all personnel are collectively responsible for safety (and in the high-angle environment we always have a second person verification of systems), you still need an overall safety officer assigned to the command team. This person has a heap of responsibilities including logging of gas monitoring, monitoring the equipment utilised (for record purposes) and should have an overall picture of the various sectors that eventually make up the operation.

First arriving units

Among the first considerations after arrival should be the identification of anchor points that are 'bombproof'. These could include emergency vehicles, overhead walkways, telephone poles and other structural elements. During this planning ensure that there is a clear path between anchor points, raising/lowering devices and the target zone.

In situations where anchor points are limited, it might be necessary to employ emergency vehicles for this purpose. Remember that once you have committed a vehicle to serve as an anchor point, you will not be able to move it. Make sure that the optimal placement is carefully considered and that while serving its primary purpose, it should not congest the scene unnecessarily. And remember to remove the keys from the ignition or, if it does not need a key, to place a notice across the steering wheel. Aerial appliances could, in certain cases, provide a number of command options such as an elevated anchor point, observation post or raising and lowering platform. The units are, however, large and heavy and their placement must be must be considered together with the benefit that could be derived from their utilisation.

In a confined environment you will want to ensure that all vehicles' engines are turned off to prevent exhaust gasses from affecting victims and personnel in the operational space.

Incident command

The operations section chief is the link between the (more strategic) incident commander (IC) and the (more task orientated) rescue team and will have to make many of the crucial calls without getting his/her hands on the operation itself.

As mentioned earlier the space in a high-angle rescue in an urban setting will most probably be limited and also draw a fair amount of onlookers. For this reason the IC must designate clear control perimeters.

The first zone (hot zone) of focus will be the area where the victim(s) are located and personnel in this zone should be limited. Under normal circumstances only the rescue team and rigging team should be located in the hot zone. The rescue team should consist of only two rescuers who will normally be lowered into the area and will be responsible for the initial emergency care and stabilisation of the victim. Loading the victim onto the stretcher and preparing the victim for the raising phase. One of these rescuers will also be the stretcher tenderer and will be raised alongside the victim. The space constraints in an urban situation might require a 'vertical lift', which will entail the stretcher being raised vertically with the rescuer in front of the stretcher facing the patient. It could be more of a challenge if the available space is so confined that the rescuer can't take up this position.

This might require him/her to be positioned either above or below the stretcher and severely limits any interface with the victim.

The other activity taking place within the hot zone will be the technical rescue operation ie rope systems and rigging and this area should be limited to personnel whose duties and responsibilities include the setup, operation and management of rescue systems. The rescue section leader and rescue safety officer could also be included in this area if it is the most advantages position to monitor the operation from.

All personnel operating at height in this area must be connected to a height safety device, which will provide optimum movement as well as fall protection. You might also need to build utility umbilicals into the system to ferry equipment and supplies to the various points in the hot zone.

The operations section chief will be located in the warm zone where liaison between the rescue teams and incident command will be easiest. The incident safety officer should also be located in this zone as it will provide more of the 'big picture'. When an additional number of 'heavy lifters' are required to assist with the raising of the stretcher, they might also be located here. Ensure that they have an unimpeded space to be able to do this task.

The incident command post will be located in the cold zone where it must provide direction and overall command and control. An officer responsible for personnel accountability and entry control into the warm and hot zones will also be in this zone as well as the rehabilitation area and any back-up and tactical reserve personnel.

Outside of these operational zones allowance must be made for a patient treatment area (PTA) and a public information area. The patient(s) wellbeing is the top priority and an important command consideration should be to determine the route that will be followed from where the patient is being raised to when he/she is set down in the PTA and eventually moved to an ambulance.

The public information officer (PIA) assigned to the incident should establish an area for the media in a position that doesn't impede the rescue operation but provides them with as much information as is legally and ethically possible in the circumstances. Let me get on my soap box for a moment. Unfortunately the worldwide hunger for information has compromised our morals to such an extent that very little consideration is given to the privacy and dignity of the patient. How often do we see news feeds of people being rescued from some disaster situation in full view of glaring TV news cameras without any sympathy for their rights to privacy? Maybe all the many organisations 'governing' rescue response should develop protocols for this problem.

Additional personnel will be required for equipment and stretcher shuttles, lighting and other support operations not directly involved in the rescue but essential to the operation. Other jobs will always pop up. The work of support personnel keeps the operation moving in the proper direction.

The incident site

The site where the incident has happened can present a number of hazards that will not be present in the wilderness environment. It might be a dark location that will necessitate the placement of lighting systems and use of headlamps. Perimeter lighting systems in a confined environment might not provide sufficient lighting all over and corners or other structures could throw shadows over important areas. Optimal placement of the lights might be a challenge in a confined area. If you can't place them on the ground, consider hanging them from overhead structures. You can, however, only do this if you have spent time back at the station looking at your lighting units and thinking up ways of hooking them up to different structures. Your more creative staff members might even be able to build a variety of fastening devices, which could become a crucial part of your rescue rig's inventory.

Do you appreciate the height hazard posed by your area of responsibility and are you able to respond effectively?

The site might contain hazardous materials or be oxygen deficient. This could necessitate the response of a hazmat team or at least necessitate the breaking out of your confined space gear such as multi-gas detectors, extractor fans and breathing systems. Extractor fans could further clutter up an already limited workspace and its placement must once again be carefully considered.

In my experience urban accident sites have never been ideal for high-angle rescue operations. I have, however, found that there is almost always enough anchor points. Make sure, however, that they are indeed bombproof (BFRs and BFTs it needs to be).

The rescue

The objective will be to reach the victim(s) as safely and quickly as possible. To achieve this we must be able to locate him/her. There might be multiple victims. In a dark location it might be helpful to bring in your thermal imaging cameras. If you can see the victim from a higher position and if it is close enough for you to see him/her, you can try to make contact ▶

- by calling out to them, if they are able to communicate. This could give you quite a bit of information that will help the command team in deciding how to access the victim(s) and what equipment might be required to be sent down to where they are located.

  Once the decision as to the method of victim access and extrication is decided on, the process of building systems should begin. This is a very intensive phase of the operation and sometimes so much is going on topside that the victim's situation becomes secondary. Don't let the patient get in the way of a good rescue. Remember, the entire operation stems from the victim's predicament.

  When you are ready to lower the rescuers to the victim, that becomes the focus and clear communication is vital. When they reach the victims it might take a while to conduct a primary assessment, provide immediate emergency care and package the patient in preparation for the raising operation. It is important to keep the operations commander and IC updates continuously, especially if they can't see the victim.

  If the victim's condition is critical and the EMS crew has to perform advanced life support protocols they might require additional staff to be lowered as well as a range of additional medical equipment. EMS command must be ready for this and be able to respond immediately.

  Another area where rescues in urban environments could differ from wilderness operations is communication. Wilderness incidents generally take place over a wide area and radio communications is the primary communications protocol. In the urban environment the distances are not that great and face-to-face communication may be all that is needed. If this is not possible and radio communications is the only way to go, you could face a further challenge of compromised reception. It might then be necessary to employ hard-line communication or, if a leaky feeder system is present, it might be possible to tap into it.

  Either way, you will have to provide hands-free communications systems to the rescuers and other personnel who will need both hands for rope work.

  I am not drilling down into the technical aspects of rope systems in this article but rather focussing on command considerations. It does, however, go without saying that all rope systems used should be fitting. No rescuer should operate with fewer than two ropes attached to him. This also goes for any victims raised or lowered on rescue litters.

In closing

I have always been of the opinion (and have mentioned in previous articles) that you can gauge the effectiveness of a fire/rescue service by checking the condition of the blades on their cutting tools. Technical rope rescue operations often show just how well or how poorly a department is prepared on the command and tactical levels. This is the reason we exist. Let's do it well.