

City of Greencastle
Fire Department

Training Division

Instruction page:

February 2013

Fire Suppression: Ventilation	Each shift shall schedule this class with Lt. John Shafer
EMS: Airway Management	Each member is assigned on the Target Safety account
Safety/Bluecard: Back Safety	Each member is assigned on the Target Safety account
Specialized: Vehicle Stabilization	Review outline below. Each shift shall complete all three skill labs and watch the video on Target Safety website in the File Center.
Misc.: Hazard Control on MVA	Review outline below
Hazmat: Hazmat Ops Module 1	Each member is assigned on the Target Safety account
Officer: IMT Concepts	Conducted by Chief Newgent at monthly officers meeting

Vehicle Stabilization

Vehicle stabilization is one of the keys to a successful extrication operation. Unfortunately, it is also frequently underused. The first rule of cribbing is nothing is stabilized until you make it stable! The second is never test stabilization, make it stable!

The concept of stabilization is simple: you are increasing the points of contact, with the ground, while evening out the vehicle's center of gravity. The more points of contact that exist with the ground, the better the center of gravity, and the more stable a vehicle will be.

The main goal of stabilization is to prevent uncontrolled movement, in any direction. Any vehicle movement can increase patient injuries or change the dynamics of the incident. Vehicles can move on five distinct planes:

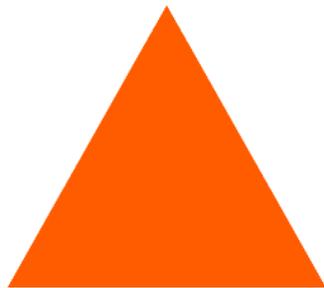
1. Horizontal
2. Vertical
3. Roll
4. Pitch
5. Yaw

There are also some other stabilization variables you need to keep in mind: are you cribbing for weight, or strictly for stability? Cribbing for weight would be for such applications as lifting, pulling, or pushing; cribbing for stability is strictly just removing potential for movement.



Stabilization Basics:

Stabilization is about stopping or preventing unwanted movement. If we use the example below, a pyramid with a narrow base is less stable than a pyramid with a wide base.



Wide footprint
will not tip easily



Narrow footprint
tips easily

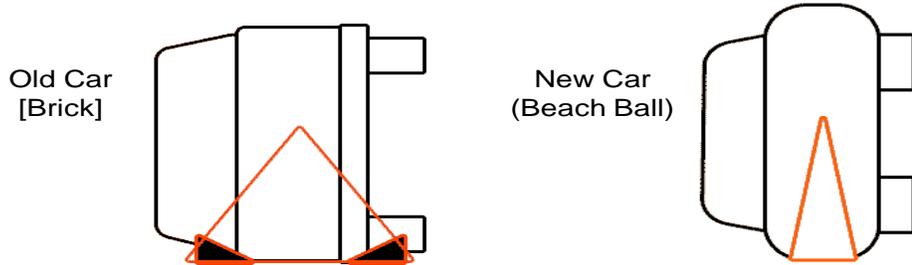




Stabilization Basics:

In the past, it was often easier to stabilize a vehicle not on its wheels. Surfaces of older cars were flat and made of steel. A couple of wedges provided enough surface area with the ground to keep the vehicle stable during extrication.

Newer vehicles often have rounded body styles and are made with thin steel or plastic dent resistant panels which can act like springs when they roll and bounce. Because they are more like beach balls than bricks they have a very narrow footprint when they land on their side or roofs, making them more unstable.



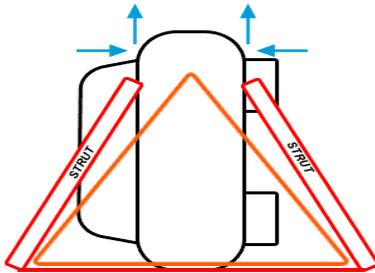
Sometimes You've Just Gotta Strut Your Stuff...



Stabilization Basics:

The best way to stabilize a "Beach Ball" car, is with tensioned buttresses. A buttress is simply a column (strut) tipped over with its top anchored to the car. Then a tensioning device (ratchet strap) is used to pull the base of the strut towards the car. This helps to apply even force to the car in a sideways and upward direction.

This provides a very wide footprint, which decreases the likelihood of the vehicle tipping over during the extrication keeping both patients and rescuers safer.



Sometimes You've Just Gotta Strut Your Stuff...

Stabilization Equipment

The equipment used for vehicle stabilization depends on many different factors. Funding is one of the bigger issues that will decide what a rescuer will have available. A rescue agency with unlimited funding could have top of the line, manufactured plastic cribbing, while an agency with limited funding could go buy 4x4's and cut wood cribbing. The point is, a rescuer must know what equipment is available and make proper use of it.

These are some commonly used tools for vehicle stabilization:

1. Come-a-longs
 - a. Hand operated
 - b. Very powerful
 - c. Pulls in a straight line only
 - d. Difficult to operate
2. Winches - use with caution, since you lose the human feel for force applied
 - a. Very powerful and useful tool
 - b. Pulls load onto shoring to lock it in place
 - c. Be wary of using mechanical force
3. Aluminum shores
 - a. Designed for trench rescue
 - b. Can hold great weight
 - c. Can fill-in large voids
 - d. Unstable in lateral aspect

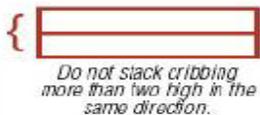
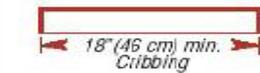
4. Cribbing

- a. Very strong
- b. Cheap (lumber variety)
- c. Easily replaced
- d. Options
 - 1) Two or four point step chocks
 - 2) Box crib
 - 3) Inverted step chocks / wedges
 - 4) Wedges
 - 5) Air bags
 - 6) Tensioned buttress system (rescue jacks)
 - 7) Any combination of the above

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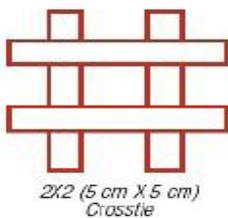
Cribbing is essential in many extrication operations. Its most common use is to stabilize objects. Wood selected for cribbing should be solid, straight and free of major flaws such as large knots or splits. Cribbing surfaces should be

free of any paint or finish because this can make the wood slippery, especially when it is wet. Cribbing can be made out of pieces of timber found in the debris and cut to size. Pieces of 2X2 (5 cm X 5 cm) and 4X4 (10 cm X 10 cm) as well as wedges cut in this size timber are very useful.

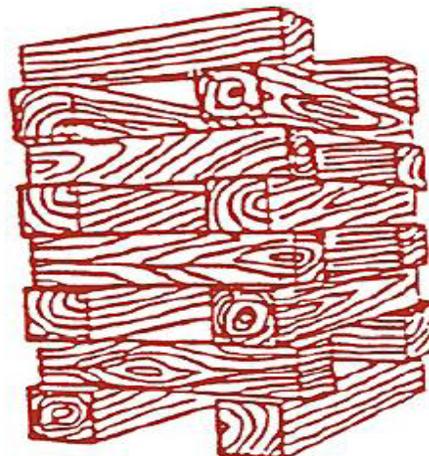
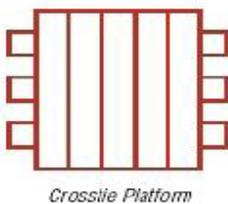
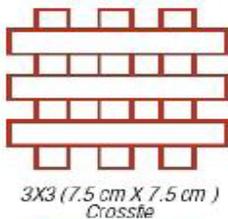


Cribbing involves multiple pieces of wood laid on the side and crossed. It spreads the load well and has many load transfer surfaces. It also has lateral stability depending on the ratio of width to height. The height should not be more than three times the width. (Note: pieces should not be more than two feet (60 cm) long.)

The overhang at corners should be no less than 4 inches.



4X4 crib capacity = 24,000 lb. (10,886 kg).
6X6 crib capacity = 60,000 lb. (27,215.5 kg).
Note: using 3 pieces per layer as in 3X3 (7.5 cm X 7.5 cm) crosstie will double the capacity.



Other stabilization questions:

1. Cribbing for the weight of an object:
 - a. Do I have enough cribbing to do this?
 - b. Can the cribbing support the weight?
 - c. What is the base material and can it support the weight?
 - d. What if I have a load shift?
 - e. How many cribbing columns do I need?

2. Cribbing for stability only – Do the rules change in this case?

When assessing a vehicle for stabilization, the way a vehicle is resting will decide how you stabilize it. A vehicle resting on its wheels is considerably easier to stabilize than a vehicle resting on its side, because it has more points of contact and a lower center of gravity. Primarily there are three ways you will find a vehicle resting:

1. On its wheels
2. On its roof
3. On its side

Wheels

A vehicle resting on its wheel is in the safest position for a rescuer on arrival. This is a fairly easy position to stabilize. The first priority is to prevent the vehicle from rolling, by chocking the wheels. After chocking the wheels, the suspension is neutralized by cribbing the vehicle with box cribs or step chocks. Once cribbed, the air is let out of the four tires and the vehicle is stabilized.

Remember, you never test for stabilization, you make it stable!

Roof

A vehicle resting on its roof presents some unique hazards. While the vehicle has a large point of contact with the ground, it is still unstable. The painted surface reduces friction and will allow the vehicle to move.

Another consideration is vehicle design. Modern roofs are constructed to hold 1 ½ times their weight, but this factor includes the front and rear glass, so if the windshield is broken, the weight factor goes down. The rescuer should concentrate on increasing the points of contact by building cribs, from the ground to the body of the vehicle, at the posts, to reduce the stress on the roof assembly.

Once this initial stabilization is in place, the rescuer should build box crib towers and run 4x4's through the rear most windows. Any remaining slack should be taken up using 4x4's cut into wedges. This will give you a stable base from which to work. You can also place high pressure air bags under the long 4x4's to allow for lifting of the vehicle, as needed.

Side

A vehicle resting on its side is the most unstable position a rescuer will find it in. These vehicles have minimal points of contact and a very high center of gravity. This position is when the rescuers must remain vigilant concerning safety. It is critical this vehicle be stabilized, prior to any other operation.

The initial step should place a rescuer on the four corners to hold the vehicle in place. These rescuers must remain outside the collapse zone. Then you should place long 4x4's from the underside of the vehicle to the ground. A Come-a-long should then be used to pull the vehicle back onto the 4x4's which decreases the center of gravity, while increasing the points of contact. This procedure is call opposing forces and it is very effective for stabilizing a vehicle on its side.

Unusual Stabilization

It is possible that a rescuer may find a vehicle in a position other than those listed above. This is a case by case situation that must be addressed when presented.

1. Use whatever equipment is available.
2. Tension buttress system
3. May need to call for additional resources.
4. Tow trucks, more cribbing, chains, cranes, etc.
5. Low pressure air bags...find out what resources in your area have them available.
Many heavy towing companies carry this equipment.

Some additional considerations:

1. Always have a safety officer monitoring these operations.
2. Stabilization is a continuous process; always reevaluate what you've done.
3. Only those working should be in the hot zone.
4. Anticipate vehicle movement, while working.
5. Don't relax when the victim is removed; maintain a safe posture until the operation is complete.

Practical Skills:

Cribbing Lab –

Purpose: To introduce the students to the basic practice of building Box Cribs for vehicle stabilization

Setup Procedure: Create 6 work stations each with 12 pieces of 4x4 cribbing wit 2 sets of 4x4 wedges. Each 8 person squad will be split into 2- 4 person teams and assigned to a work station.

Protective Equipment Requirements:

- Helmet
- Rescue Gloves
- NFPA Approved Eye Protection
- Steel toed Boots

Box Crib to be built:

- 4 point box crib 4 rows high wedge finish
- 4 point box crib 3 rows high with solid top
- 9 point box crib 4 rows high wedge finish
- 4 point box crib 3 rows high angled at the base
- 4 point box crib 3 rows high angled at the top

Information to deliver: Proper construction of each crib. Stress the importance of neatness and precision. Ensure that wedges are properly supported.

Aluminum Shores Lab -

All shifts need to set up both Shores on Rescue 1 as if a vehicle is on it side and this can be simulated on the back parking lot wall.

Winches Lab -

All shifts need to stabilize a vehicle with Rescue 1, Brush 6 and Tactical 1 winches.

Hazard Control

Since safety is the rescuer's #1 consideration, this is the first operational action taken. Hazard control may consist of chocking the wheel on a car and disconnecting the battery or you may require other resources, such as the power company to assist.

Fire

Vehicle fires represent a large hazard to rescuers. Vehicles are primarily made of plastics and other manmade materials that produce toxic smoke containing hydrogen cyanide. They also have fuel systems, electrical systems, and pressurized cylinders, that present both explosive and projectile hazards.

When you have an extrication to perform on a burning vehicle, obviously the fire must be extinguished first. Engine compartment fires can be extinguished quickly, through the grill with a dry chemical extinguisher. If you must use water be cognizant of where you are pushing fire. It is possible to push fire into the passenger compartment onto the victim you are there to save. This would also be an appropriate place to use rapid extrication techniques.

Fuel/Fluid Leaks

On the surface these may seem like imminent life hazards, but generally, they are hazards that are easily controlled. It could be as simple as turning off the key, to shut off the fuel pump, and shoveling some dirt onto the spilled material.

The key to a fuel spill is to be aware of it and take safety precautions to prevent escalation. For larger spills, this may require a foam blanket to be put down, for your protection. At the minimum, there should be a dry chemical extinguisher and a charged 1 ¾ hose line in place.

Down Power Lines

A common misconception with power lines is "fire boots offer protection, since they are rubber". This statement is completely untrue; the high carbon content in the rubber used makes them better conductors. If you have electrical lines involved in a crash, back off and wait for the power company to arrive. They have the expertise and equipment to deal with this, rescuers DO NOT!

You can offer some instructions to someone trapped in an energized vehicle, such how to control bleeding, but advise them to stay there. If, because of fire, they have no choice but to get out, instruct them to jump as far as possible and roll to avoid completing the circuit.

Hazardous Materials

Hazardous material incidents require specialized training and equipment that most rescuers lack. When in doubt, always call a Haz-Mat Team. Defensive measures such as diking, damming, and diverting are within the scope of your training.

Traffic Control

Apparatus, on scene, should always be used with traffic control cones for blocking barriers, between the operational area and approaching traffic. Rescuers should always maintain their situational awareness to traffic as well.

Incident Safety Officer

Every working incident should have an assigned safety officer. This person's job is to oversee safety for the entire incident. The Safety Officer also has the authority to stop any action that is causing an unsafe situation. The Safety Officer should wear a vest for identification.

