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Extrication Zone, Technical Rescue

Extrication: Stabilization Crib Notes

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By Clinton Crafton

The most common technical rescue response from coast to coast is vehicle and heavy vehicle extrication. Virtually every fire department deals with some degree of vehicle extrication, from major urban areas to smaller rural districts. As such, extrication is often viewed as a basic skill, learned in fire school and honed on the job. However, many of us only occasionally respond to truly complex and challenging entrapments. Even areas that were once a hotbed of pin-jobs on a Saturday night have seen these incidents decrease dramatically. Engineered solutions such as roundabouts, center divider cables, airbag improvements and supplemental restraints, and legislation to limit distractions in the car have all helped to reduce the number and intensity of accidents in many areas. The result of this is that fire departments may have only a handful of skilled extrication specialists and an abundance of great firefighters looking to them for guidance and instruction on an incident scene. As with anything in the fire service, some will get comfortable with that crutch until it's not there.

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In the Federal Emergency Management Agency (FEMA) Urban Search and Rescue (USAR) system, team members must remember an extraordinary amount of information on top of their normal job responsibilities. Some of those members have the opportunity to train often or dedicate themselves fully to the craft of technical rescue. The vast majority though, don't enjoy that luxury, and must rely on other tools. Enter the field operations guide (FOG) and the shoring operations guide (SOG), two manuals that every collapse technician will have in their go bag on any deployment. These

books are packed with information, charts, diagrams, and references to assist the rescuer in selecting and building shoring of all types and designs. These "cheat sheets" or "crib notes" are the key to success for the many of us that only exercise these skills a few times a year. Is it cheating to rely on such a crutch? Of course not, and no one in the collapse rescue world would fault anyone for grabbing the SOG out of their pocket. More importantly, the victim waiting to be rescued won't pass any judgment at all when the rescuer confirms their actions with their notes. So why wouldn't we carry such crib notes for everything we do?

As an instructor for the FDIC International heavy vehicle hands-on training program, our group often discusses one common recurring theme among many students: the tendency to revert back to tactics and techniques that were taught in the mid-'80s. Our anecdotal observation is that many fire departments haven't grasped newer techniques or practices in extrication. Instead, we tend to fall back to our primal training when stressed (like when a young firefighter is holding the tool in front of 20 rescuers from around the world in a class...that kind of stress!) We literally and mentally go back to basics. Let's face it, even in basic extrication there is still too much to remember. Let's explore how some simple crib notes in your pocket can help you on your next extrication. There's no need to get fancy here; a simple notebook or some laminated 3×5 cards can do the trick. Just simple cheat sheets on the information you need at hand.

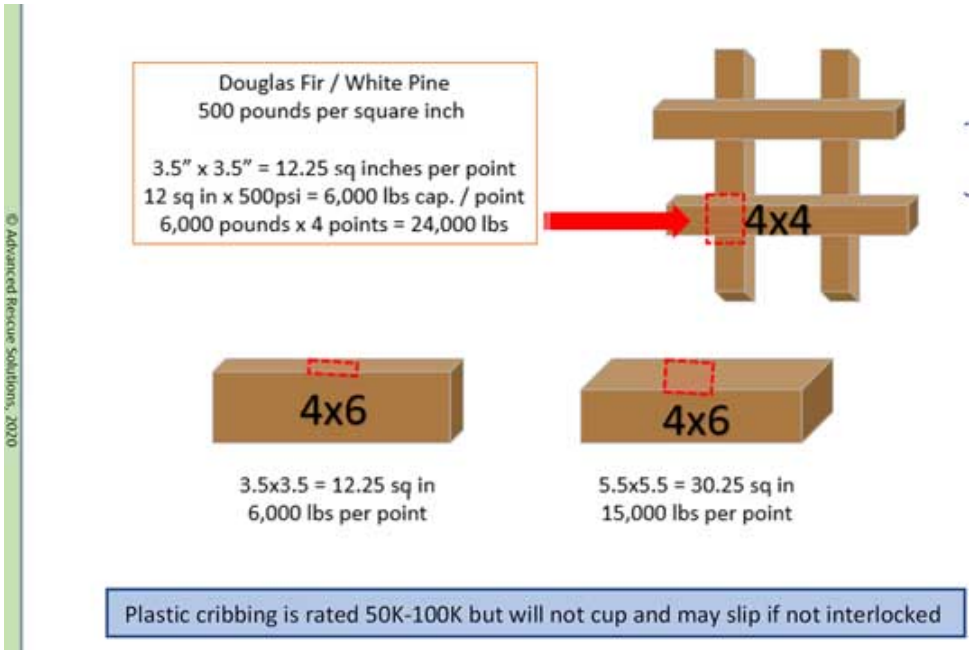
Among the many things that we struggle to keep tabs on is the very first thing we face—stabilization. On 90 percent of the calls we respond to, a simple 4×4 crib block and a wedge will do the job. Simple, right? As long as we remember to crib at points of contact (think, where would you put the jack to change a tire?) and not weak spots (plastic) and most cribbing jobs are a piece of cake. But what happens when we face an under-ride call on the interstate and there's a semi truck involved? Cribbing still works but it takes more lumber than most of us carry. How about struts? Struts will save the day here, right? Maybe, but what are the capacities of your struts? Pop quiz: What are the capacities of your struts when it's 2 a.m. and you've just rolled out of bed? Not so easy to recall all the numbers at that point, right? Let's look at a couple of easy reference points.

First, you must know how much weight you're trying to stabilize. Remember, we're not trying to lift the load when stabilizing, just capturing all movement. Remember that our friend gravity is actually actively stabilizing some, if not most, of the weight. Simply take the estimated weight of the load and choose the appropriate stabilization tool to capture movement. A quick scan of the Internet will give a good approximation of most vehicle weights. Depending on what you may run into in your response area, a great crib note to start with might be vehicle weights.

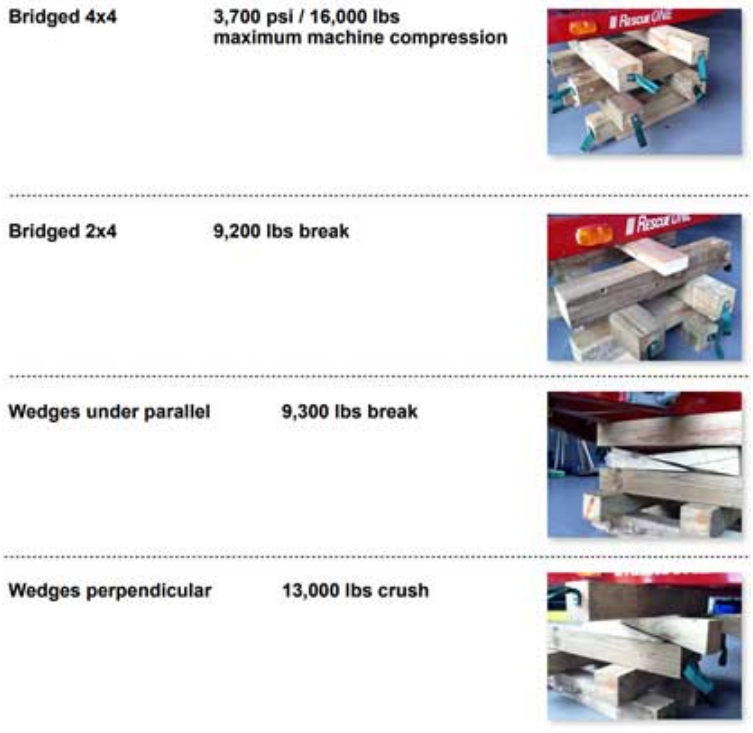
A general estimation of common vehicle weights

Wood cribbing is the ubiquitous standard for stabilization for many reasons: it's cheap, it's readily available, and it has great weight-carrying capacity versus its weight. Many rescuers can tell you that a 2×2 stack of 4×4-inch cribbing will support around 24,000 pounds. But some of those same rescuers will struggle if you ask what the capacity is if we change to 4×6 cribbing. In fact, it remains the same (assuming it's standing on the 6-inch side), because cribbing capacity is based on the footprint of contact and the general acceptance of 500 psi capacity. While wood can vary from 200 psi to 1,500 psi crush resistance, the general rule of thumb is that Douglas fir and Southern white pine are around 500 psi compressive strength (deflection in the cross grain that results in fiber

breakage). If we jump from compressive strength (crushing in the crib stack) to fiber stress in bending (capacity of a crib if it is 'bridged" across the stack) then we see a whole new set of math and calculations. In fact, many rescuers will struggle with the question of bridging a 4×4 at the top to make contact. Although not the ideal setup for stabilization, there are many circumstances in which that is the best point of capture. Once again, we see a useful application for some crib notes, especially for the instructor who gets thrown a curve ball during extrication training.



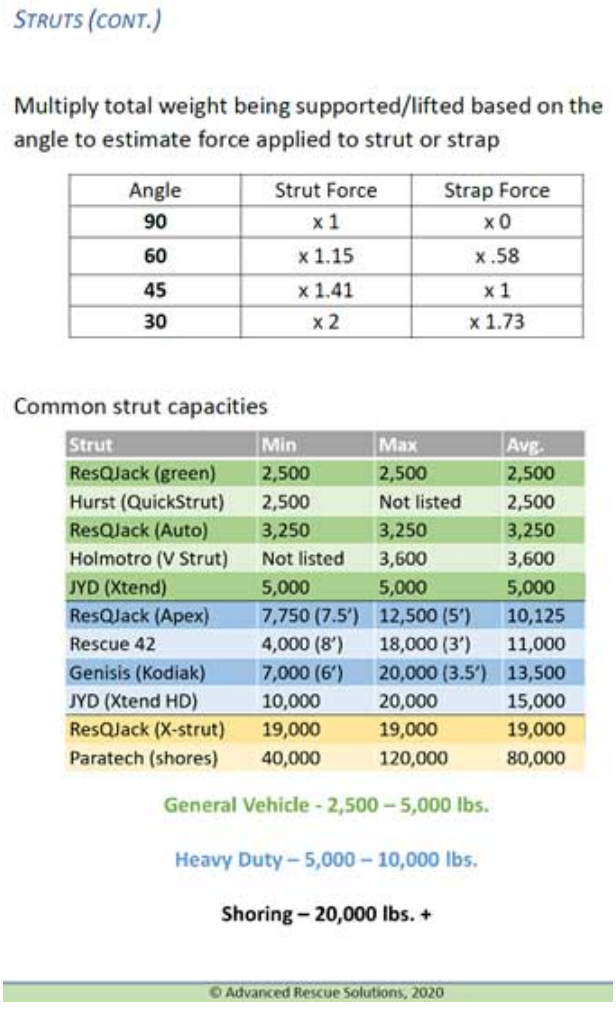
Comparative calculations for cribbing capacity



Exploring 'bridged' cribbing: Please note, these simple tests do

not reflect scientific testing or an appropriate safety margin.

Another common form of stabilization that has really changed the game in the last 10 years is lightweight struts. What started as large timbers has now transitioned into metal and composite lightweight struts that can capture tremendous loads in a single or double buttress configuration. As pointed out earlier, the challenge is in knowing what your particular set of struts are capable of supporting. Most manufacturers now post the limits directly on the strut itself, which is very helpful given the fact that capacity changes depending on length of extension and design application. A very basic rule of thumb is that lightweight struts will hold around 5,000-7,000 pounds and pneumatic shores will bump that well into the range of 20,000 pounds or more. Want an easy way to remember what is on your rig at 2 a.m.? Write it down on some crib notes. In fact, crib notes can take this a step further for the instructor waiting for the tough questions on the drill ground. For example, how much weight is on the strut in a leaning car vs. a car on its side? Or how much force is being placed on the strap holding two struts together? A little trigonometry can answer that one for us but it's not something most of us keep in the forefront of our mind.



STRUTS (CONT.)

Multiply total weight being supported/lifted based on the angle to estimate force applied to strut or strap

Angle	Strut Force	Strap Force
90	x 1	x 0
60	x 1.15	x .58
45	x 1.41	x 1
30	x 2	x 1.73

Common strut capacities

Strut	Min	Max	Avg.
ResQJack (green)	2,500	2,500	2,500
Hurst (QuickStrut)	2,500	Not listed	2,500
ResQJack (Auto)	3,250	3,250	3,250
Holmotro (V Strut)	Not listed	3,600	3,600
JYD (Xtend)	5,000	5,000	5,000
ResQJack (Apex)	7,750 (7.5')	12,500 (5')	10,125
Rescue 42	4,000 (8')	18,000 (3')	11,000
Genisis (Kodiak)	7,000 (6')	20,000 (3.5')	13,500
JYD (Xtend HD)	10,000	20,000	15,000
ResQJack (X-strut)	19,000	19,000	19,000
Paratech (shores)	40,000	120,000	80,000

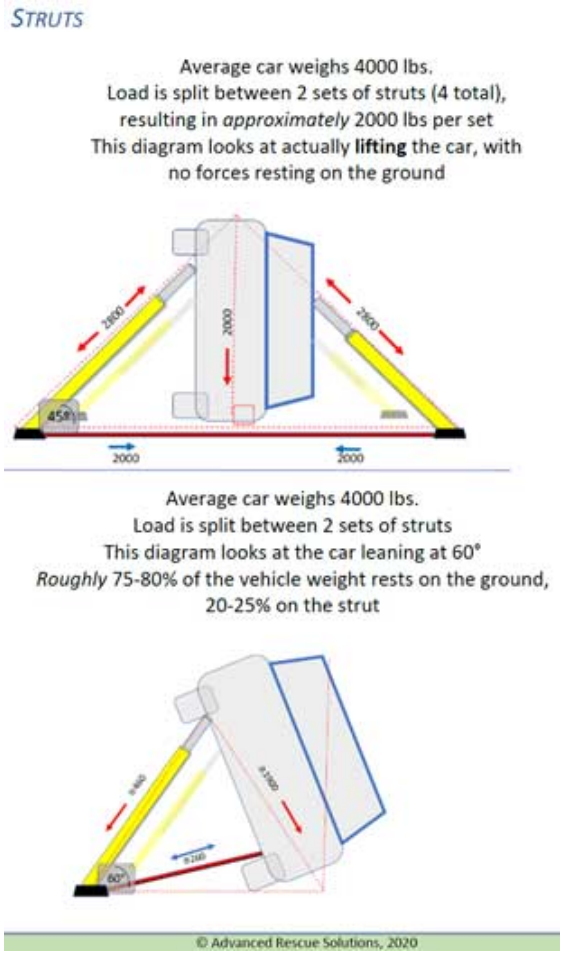
General Vehicle - 2,500 – 5,000 lbs.

Heavy Duty – 5,000 – 10,000 lbs.

Shoring – 20,000 lbs. +

Quick cheats to help with a variety of math or tables

can be helpful at 2 a.m.



When instructing in the field, jot down some diagrams to help relay the information to the students. The days of drawing with an antenna in the dirt have long since passed

As we look at these items, we realize that this is just the tip of the iceberg. Technical rescue, even basic auto extrication, is filled with complexities that force us to revert to our lowest level of competence (or unconscious competency). Mastery of a skill takes thousands of hours of training and practice. Depending on what study you choose to follow, it could be anywhere from 2,000 hours to 10,000 hours of dedicated training. How often do you get to the yard to cut cars? If you make it out once a month and drill hard for the whole day, you might be at your peak when you hit

your 20-year anniversary. Don't forget that you also have to stay on top of your firefighting skills, emergency medicine, hazmat, public education, and basic furnace repair (if you have the same customers as us!) Don't be afraid to stack the deck in your favor. Put some crib notes in your pocket and give yourself the advantage.

Thus far, we've only looked at stabilization, we haven't even dug deep into the first of the many disciplines of technical rescue. Next time, we'll look staying a step ahead of the basics in extrication techniques. Sneak peek – having some cheat sheets will help there too!

Clinton Crafton is the deputy chief of Operations with the Whitestown Fire Department, on the northwest side of Indianapolis, Indiana. With 27 years in the fire service, Clinton has served in all roles from firefighter through deputy chief. Along the way, Clinton has found a strong interest in technical rescue, leadership psychology, and technology in the fire service. More at www.advancedrescue.com.

More info about the Advanced Rescue Solutions Instructor Field Guide.

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