CPVR & HEAVY VEHICLE RESCUE

TECHNICIAN LEVEL

Technician Level

Nebraska Task Force One

Updated: 6/2022

OBJECTIVES (NFPA 1006) AWARENESS LEVEL

8.1.1 Establish scene safety zones

8.1.2 Size up an incident

8.1.3 Recognize incident hazards and initiate isolation procedures

8.1.4 Recognize the need for technical rescue resources at an operations or technician level incident

8.1.5 Support an operations or technician level incident

CPVR OBJECTIVES (NFPA 1006) OPERATIONS LEVEL

- 8.2.1 Create an IAP for common passenger vehicle incident
- 8.2.2 Establish fire protection
- 8.2.3 Stabilize a common passenger vehicle that has come to rest on its wheels on the road surface or similar flat stable environment
- 8.2.3A Describe five directional movements during stabilization
- 8.2.4. Manage potentially harmful energy sources
- 8.2.5 Determine the common passenger vehicle access and egress points
- 8.2.6 Create access and egress openings for rescue from a common passenger vehicle on its wheels,
- 8.2.7 Disentangle victim (s)
- 8.2.8 Remove a packaged victim to a designated safe area
- 8.2.9 Terminate a vehicle incident

CPVR OBJECTIVES (NFPA 1006) TECHNICIAN LEVEL

- 8.3.1 Create an IAP for an incident where a common passenger vehicle has come to rest on its roof.
- 8.3.2 Stabilize a common passenger vehicle that has come to rest on its roof.
- 8.3.3 Create access and egress openings for rescue from a common passenger vehicle that has come to rest on its roof.
- 8.3.4 Create an IAP for an incident where a common passenger vehicle has come to rest on its side.
- 8.3.5 Stabilize a common passenger vehicle that has come to rest on its side.

CPVR OBJECTIVES (NFPA 1006) TECHNICIAN LEVEL (CONTINUED)

- 8.3.6 Create access and egress openings for rescue from a common passenger vehicle that has come to rest on its side.
- 8.3.7 Create an IAP for an incident where a common passenger vehicle has come to rest in a configuration or environment where multiple concurrent hazards must be managed to access or remove the occupants.
- 8.3.8 Stabilize a common passenger vehicle that has come to rest in a configuration or environment where multiple concurrent hazards must be managed to access or remove the occupants.
- 8.3.9 Disentangle victim (s)

HEAVY VEHICLE OBJECTIVES (NFPA 1006) AWARENESS LEVEL

9.1.1 Size up a heavy vehicle rescue incident

9.1.2 Recognize incident hazards and initiate isolation procedures

9.1.3 Recognize the need for technical rescue resources at an operations- or technician-level incident

9.1.4 Support an operations- or technician-level incident

HEAVY VEHICLE OBJECTIVES (NFPA 1006) OPERATIONS LEVEL

- 9.2.1 Create an incident action plan for a heavy vehicle incident
- 9.2.2 Establish fire protection
- 9.2.3 Stabilize a heavy vehicle that has come to rest in its position of use
- 9.2.4 Isolate potentially harmful energy sources
- 9.2.5 Determine the heavy vehicle access and egress points
- 9.2.6 Create access and egress openings for rescue from a heavy vehicle
- 9.2.7 Disentangle victim(s)
- 9.2.8 Remove a packaged victim to a designated safe area
- 9.2.9 Terminate a heavy vehicle incident

HEAVY VEHICLE OBJECTIVES (NFPA 1006) TECHNICIAN LEVEL

- 9.3.1 Create an incident action plan for an incident where a heavy vehicle incident has come to rest
- 9.3.2 Stabilize a heavy vehicle
- 9.3.3 Lift a heavy vehicle, given a heavy vehicle incident
- 9.3.4 Coordinate the use of heavy equipment as a part of a plan to lift
- 9.3.5 Create access and egress openings for rescue from a heavy vehicle
- 9.3.6 Disentangle victim(s), from a heavy vehicle
- 9.3.7 Remove a packaged victim to a designated safe area

HEAVY VEHICLE OBJECTIVES (NFPA 1006) OPERATIONS LEVEL

STANDARD TERMINOLOGY FOR VEHICLE EX

- Disentanglement
- Extrication
- Stabilization
- Beneficial System
- Common Passenger Vehicle
- Competent Person
- Critique
- Heavy Vehicle

DISENTANGLEMENT (NFPA 1006 TERMINOLOGY)

- Process of removing the vehicle away from around the patient with a minimum of manipulation of the patient by:

1. Door Removal
2. Force Seats
3. Move Pedals
4. B Pillar Removal on 4 door vehicles
5. Third door technique
6. Roof Removal
7. Dash Roll/Lift

- Disentanglement takes places after simple maneuvers would have failed or did fail

EXTRICATION (NFPA 1006 TERMINOLOGY)

- Patient packaging and removal with minimal manipulation, thereby minimizing aggravation of any injuries

STABILIZATION (NFPA 1006 TERMINOLOGY)

- Process of assessing for potential movement of the vehicle followed by the practical application of the necessary tools and equipment to reduce or eliminate that movement
- Purpose

1. To make a safer working environment for the rescuers as they operate in or around vehicles
2. To prevent more extensive injuries to the victims involved by reducing or eliminating any further movement of the vehicles.

BENEFICIAL SYSTEM (NFPA 1006 TERMINOLOGY)

- Auxiliary-powered equipment in motor vehicles or machines that can enhance or facilitate rescues such as electric, pneumatic or hydraulic seat positioners door locks, window operating mechanisms, suspension systems, tilt steering wheels, convertible tops or other devices or systems to facilitate the movement (extension, retraction, raising, lowering, conveyor control) of equipment of machinery.

COMMON PASSENGER VEHICLE (NFPA 1006 TERMINOLOGY)

- Light or medium duty passenger and commercial vehicles commonly encountered in the jurisdiction and presenting no unusual construction, occupancy, or operational characteristics to rescuers during an extrication event.

HEAVY VEHICLE (NFPA 1006 TERMINOLOGY)

- Heavy duty Hwy, off road construction or mass transit vehicles constructed of materials presenting resistance to common extrication procedures, tactics, and resources and posing multiple concurrent hazards to rescuers from occupancy, cargo, size, construction, weight or position

COMPETENT PERSON (NFPA 1006 TERMINOLOGY)

- One who is capable of identifying existing and predictable hazards in the surroundings or working conditions that are unsanitary, hazardous, or dangerous to firefighters, and who authorization to take prompt corrective measures to eliminate them.

CRITIQUE (NFPA 1006 TERMINOLOGY)

- A post incident analysis of the effectiveness of the rescue effort.

RESCUE INCIDENT & TEAM (NFPA 1006 TERMINOLOGY)

- Rescue Incident: An emergency incident that primarily involves the rescue of persons subject to physical danger and that could include the provision of emergency medical care, but not necessarily!

- Rescue Team: Combination of rescue training individuals who are equipment and available to response to and perform technical rescues!

THE GOLDEN HOUR

- PHILOSOPHY STATES THAT THE PATIENT'S IMMEDIATE NEEDS AND CONDITION DICTATE THE METHOD USED TO EXTRICATE HIM/HER.

60 MINUTES (NATIONAL STANDARD)

5 minutes	10 minutes	30 minutes	5 minutes	10 minutes
Time of incident to notification	Time of notification to arrival of first units	Time of arrival to complete extrication of patients	Time of patient removal and preparation for transport	Time available for transport to appropriate medical facility

NATIONAL STUDIES HAVE SHOWN THAT MOST OF THE TIME CONSUMED IN THE GOLDEN HOUR IS DUE TO TRANSPORT TIMES BETWEEN APPROPRIATE MEDICAL CENTERS. BY MASTERING OUR PROFESSION, WE INCREASE TIME FOR TRANSPORT WHICH IN TURN INCREASE THE CHANCES OF SURVIVAL!

HOW DO WE DO THIS?

By Implementing a TEAM Approach!

THE TEAM APPROACH

- The TEAM APPROACH means that the team pre-plans its moves, trains together as a unit and pre-assigns job functions whenever possible.

- This is done by talking about what you are going to do, before you do it, and then trying to follow your plan on the street

THE TEAM APPROACH IS NOT:

- Intended to be a rigid plan
- Set in stone
- Nor is it intended to be a comprehensive set of actions that attempt to address every conceivable situation
- The way the captain would do it
- The way the instructor taught me

THE TEAM APPROACH IS:

- Simply a way to organize in advance the tasks that you expect to perform
- Flexible
- Creative
- And most of all.....WELL COMMUNICATED!

TEAM APPROACH

- When preplanning for extrication, it is essential to learn to remove as many variables from each situation as possible.

HOW??

- Immediately using the most fail-safe techniques for each given job to be performed. This will help reduce wasted effort and wasted time.

REMEMBER…..

- There is no such thing as a technique that is 100% effective. We should judge the technique we use against a standard of 100%.
- Use the techniques that work best in MOST cases in order to save time!

HELP THE VICTIM – MEDICAL CONSIDERATIONS

Besides the ABC concerns for our victims.....there are two other medical emergencies we must be aware of!

Compartment syndrome & Crush Injuries

CI AND CS

- Crush injury (CI) and compartment syndrome (CS) are different processes with similar pathophysiology.
- A crush injury results from prolonged continuous pressure on large muscles like those of the legs or arms, which results in muscle disintegration.
- Compartment syndrome can be defined as any condition in which a structure such as a nerve or tendon has been constricted within a space. Compartment syndrome is most often associated with deep tissue injury that results in a restriction of outward swelling caused by a collection of blood in the injured tissue due to the inflexible muscle fasciae. This results in increased pressure within the space and swelling that is concentrated inward toward the injured and uninjured tissues and structures. Compression of the internal structure's forces restriction of blood flow because capillaries are compressed by the high compartmental pressures.

PATHOPHYSIOLOGY OF CI

- As the compression occurs, cells in the immediate area are quickly damaged.
- Within the next hour, the pressure continues to decrease circulation to the area. When this happens, the decrease in oxygen requires the cells needing to switch how they are able to function. This altered process is called anaerobic metabolism — which is metabolism without oxygen — and generates large amounts of lactic acid. With the decrease in oxygen, the cell walls have a harder time containing cell contents, which begin to leak through the walls because of the increasing wall permeability.
- Cells continue to leak, and other cells begin to die. As this happens, their contents — which can include potassium, myoglobin, purines and other toxic substances — are dumped from the cells into the surrounding tissues. These contents cause major problems and can kill the patient.

PATHOPHYSIOLOGY OF CI

- Once freed and the weight is released, blood flow is returned, and all the cell contents are now spread throughout the body. Without proper treatment, the effects of these contents are:
  1. Potassium — Potassium is normally kept in balance within the body. However, excess potassium leaking from the cells will disrupt the conductivity of the heart, causing arrhythmias or even cardiac arrest.
  2. Myoglobin — Myoglobin can be toxic to the renal tubular cells. Myoglobin can precipitate in the renal system (kidneys) and obstruct renal flow leading to failure or rhabdomyolysis.
  3. Purines and other toxic substances — Can lead to respiratory distress and liver damage.
- Depending on the amounts of toxins and chemicals that are released and spread throughout the body, an alert and conscious patient may rapidly deteriorate. Depending on the areas impacted, they may suffer cardiac arrhythmias or cardiac arrest, renal failure, and a number of other body system failures.

SIGNS & SYMPTOMS CI

- The patient may present in a variety of ways. They may be relatively stable, conscious and alert. It may be difficult to determine the extent of injury because of the crushing object involved (rubble, soil, grain, vehicle, dash, etc.). The patient may have palpable distal pulses; however, that can be difficult to assess depending on the situation. They may experience paresthesia — or numbness — that can actually mask their true level of pain.
- Crush syndrome should be expected if any of the patient's lower extremities, buttocks or upper thoracic region/arms are compressed.
- As Rescuers we immediately notify the ALS provider! They will need to perform ALS interventions prior to, during and after they extrication! The Paramedic and Rescue Team will need to work TOGETHER!
- Can provide BLS treatment if a provider is available and not engaged in the extrication….. But remember we are the rescuers…. Let the paramedics perform care if its needed!

HOW DOES CRUSH INJURY HAPPEN

- Typical causes of crush injury include being trapped under a vehicle or related to industrial, construction, or agricultural accidents. In natural disasters such as major earthquakes, 3 to 20 percent of mass casualties may involve crush injuries due to building collapse and entrapment.
- Patients with crush injuries are often trapped at the scene needing extrication by rescuers

WHAT DO WE CARE AS RESCUERS?

- #1 reason we are there = Victim
- ALS intervention may be a survival factor that allows the patient to remain stable and survive long periods of time.
- Rescuers often do not realize that the patient needs treatment before physical extrication of the patient.
- If the patient does no require immediate intervention continue the rescue until hand off to ALS. Do not let prolong the extrication for interventions that can be done after the extrication, in a more controlled environment (medic unit vs mangled vehicle)

See a common theme yet.... TEAM APPROACH!

VEHICLE EXTRICATION IS DANGEROUS

- We minimize risk to our patients by extricating in a controlled manner and without creating any more significant damage

SIZE UP CONSIDERATIONS

Always consider the level of entrapment

- Light Entrapment – To free victim using one move of hand tools, (such as popping a door). In most cases this would only require a single engine company and medic unit.
- Moderate Entrapment – To free victim using two moves of hydraulic tool or device, (such as roof removal and popping a door).

**Heavy Entrapment – To free victim using three or more moves of a hydraulic tool or device, (such as roof removal, popping a door and a dash roll up). This level of entrapment will require numerous dedicated resources .

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STANDARD APPROACH TO VEHICLE EXTRICATION

Priorities

1. Stabilize
2. De-energize
3. Extrication
4. Safety

STABILIZATION KEY POINTS

- Step Chalks, wedges, Kodiak system for Rescue Alarms (scene size up makes determination)
- Wheel chalks from Engine can be used
- Consider flattening tires (last resort)
- Place vehicle in park/set emergency brake/unlatch seatbelts (Can be done with maintaining C-Spine)

DE-ENERGIZE KEY POINTS

- Ask driver to move seat all the way back and roll down drivers side window
  1. Allows access to hood latch/pull
  2. Increasing distance from Air Bag
  3. Eliminating window glass for safety
  4. Creating more leg room for patient removal
- Battery Access
  1. Ask occupant where battery is located if known (depends on patient condition)
  2. Do best to locate it yourself
  3. Shut off ignition/secure keys/proximity start key fob (move at least 25’ away)
  4. Hybrid vehicles – Personnel maintaining C-Spine can shut down main power on dashboard
- Unlock All doors (if possible)
- Disconnect battery

DISCONNECTING BATTERY

- Prefer to loosen at terminals
- Try not to cut them but if damage to engine compartment does not allow disconnection, cut them
- If the vehicle is not drivable and is being towed, always disconnect battery to prevent fire concerns enroute to the junk yard.

EXTRICATION KEY POINTS

- Remove plastic covering on A, B, & C posts
- Patient preparing for extrication – Can be assigned to a any BLS or ALS provider in the vehicle
  1. Disposable Blanket for covering patient
  2. Talk to patient, build rapport
  3. Maintain C-Spine
- Communicate with Rescue Group Supervisor

SAFETY CONSIDERATIONS

- Don all necessary PPE
- Communicate Rig response routes, especially truck company scene access and route of travel information
- Hose line will be charged when extrication takes place
- Hybrid Recognition – Disconnecting main power
- Relaying any needs to incoming rigs and rigs on scene. (Additional resources, or tools unseen hazards, etc)
- Staying out of the airbag zone
  1. 5 ‘ for the side curtain airbags
  2. 10’ for the driver's airbags
  3. 20’ for the passenger’s airbags

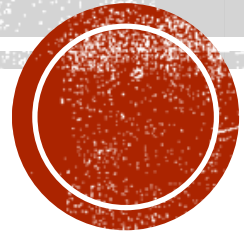
ELECTRICAL SAFETY CONSIDERATIONS

- Downed lines
  1. Contact LES immediately
  2. Risk vs Reward for active rescue
- Damaged street/traffic lights
  1. Streetlights are minimum of 220 volts – 15 amps, most are much higher
- Batteries
  1. Control hazards by de-energizing where possible vehicle systems that pose hazards to rescuers or victims. These systems can include components such as electrical, fuel, chemical, and pneumatic systems, including fuel pumps, air bags, alternative fuel sources, and air suspension systems. Care should be taking in controlling hazards not to eliminate the potential use by rescuers of beneficial systems, such as seat adjustments or positioning controls, restraint retractors or other powered devices that would enable more efficient operations.
  2. After stabilization and access to patient has been accomplish battery disconnection can be performed.

PATIENT CONDITION CONSIDERATIONS

- Triage is a BLS procedure. It is everyone's job to keep eyes on the victim and continuously reassess patient's condition. A patient may seem non-critical during initial triage but over minutes can become critical, affecting the approach we use to extricate.
- The Medic assigned to patient care directly in the hot zone will remain in contact with the Rescue Group Supervisor to collaborate on both patient care and extrication strategies. We all have the same goal! **We are ultimately there for the victim!**
- Assessing the patient injuries & LOC may warrant immediate ALS intervention while working simultaneously to extricate
- Consider "Smash & Grab" if the patient is critical. This needs to be communicated with Rescue Group supervisor so the extrication tactics meet the needs of the patient's condition.
- If the patient is stabilized it may be better to allow normal extrication procedures before starting care. The risk vs benefit must be considered. Placing another person in a vehicle at ANY time that needs extrication creates the possibility of another victim. This risk vs benefit is based on patient condition!

NOW THE FUN STUFF



VEHICLE ANATOMY

- Introduction and familiarization of modern vehicle construction types and terminology.

- It's also to increase awareness of new designs and materials in late model vehicles, as well as, the challenges and hazards they may present.

- What we're cutting up in the junkyard isn't what's crashing on the highway.

VEHICLE ANATOMY

Modern Vehicles

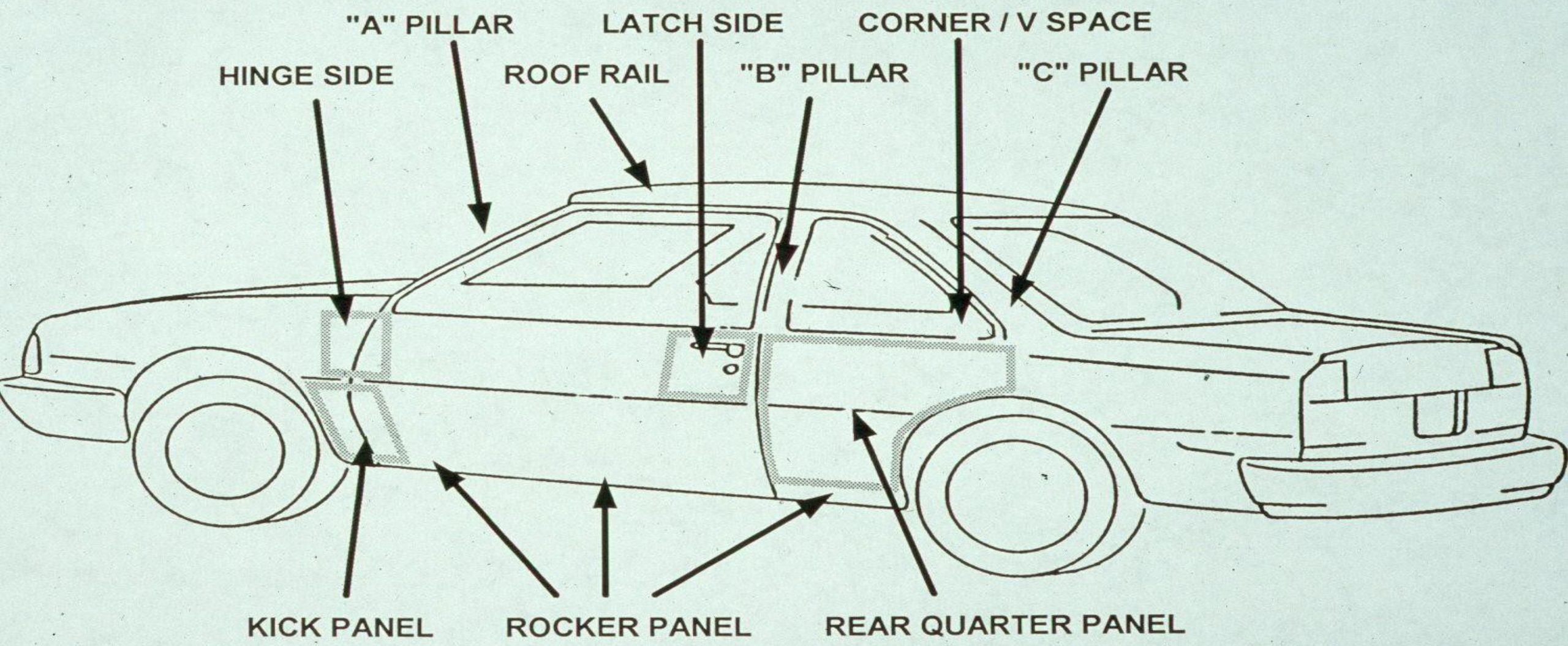
- HSLA
- Assisted seat belt retractors and pretensioners
- More air bags, high-pressure canisters
- Additional lateral strength for new side-impact standards
- Beefier hinges and roof rails
  - New cars have never been safer…..until next year!

✓This makes our job much harder.

✓As well as more hazardous.

✓We now worry about which safety equipment is going to hurt us.

VEHICLE TERMINOLOGY



SAFETY FEATURES

- Prevent intrusion into passenger compartment

- Transfer energy to crush points that buckle and absorb force (fenders & hood)

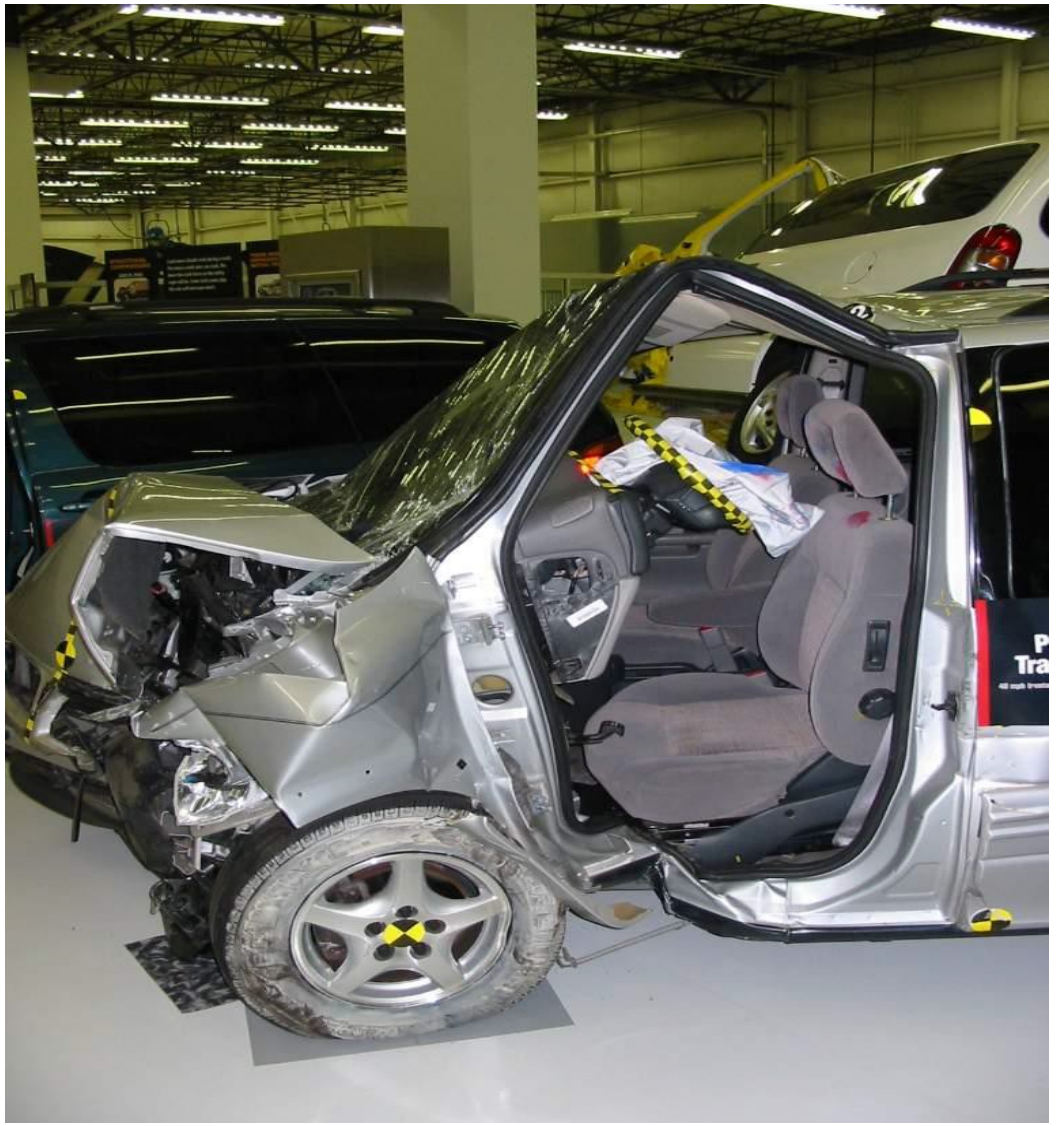
AUTOMOBILE DESIGN

- ***Bad Design***

- Crash test at 40 mph.

- Note amount of "living space", this is fatal.

- Roof is up, dash is down



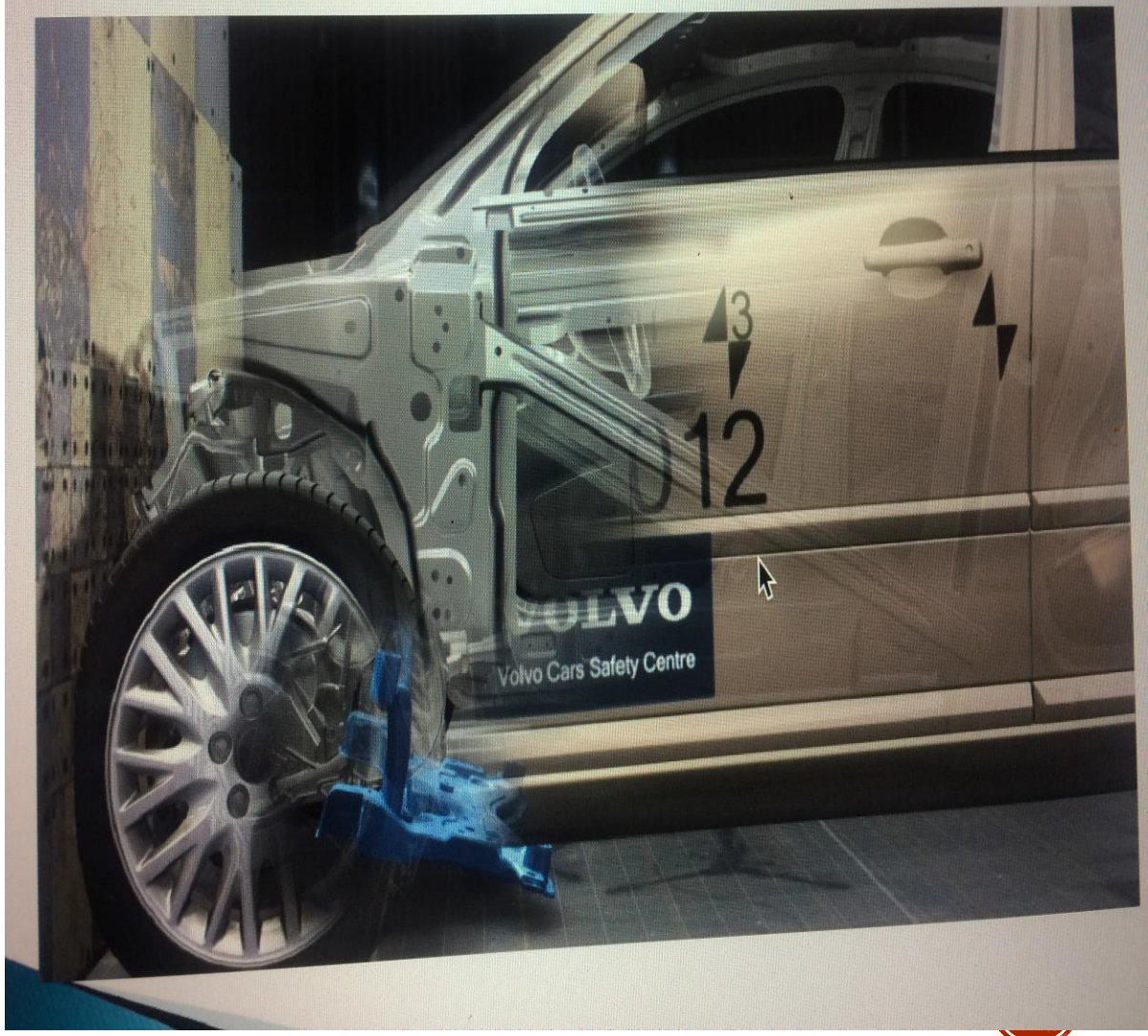
AUTOMOBILE DESIGN

Good Design

- Also tested at 40 mph.
- Note amount of "living space", a survivable accident.

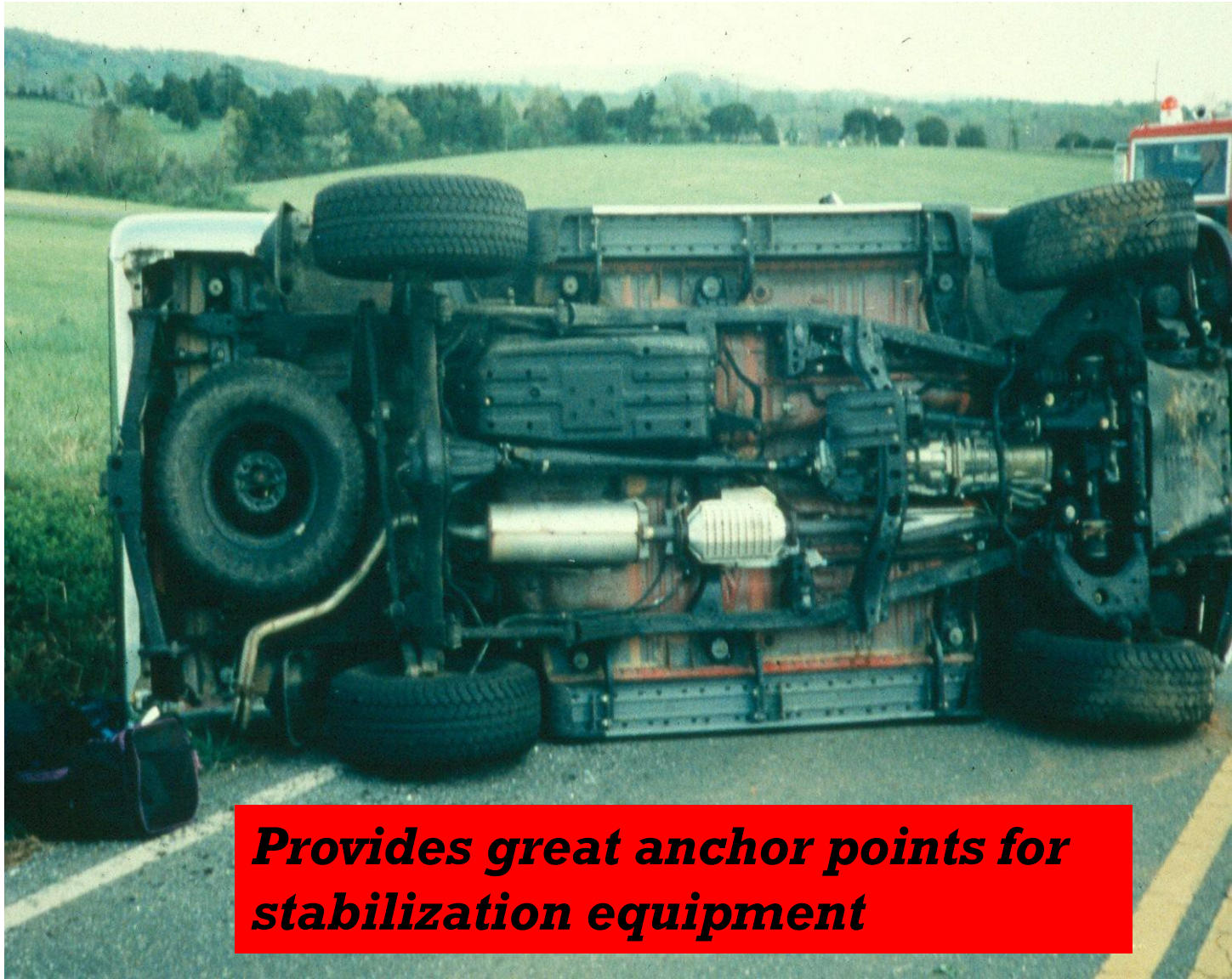
Crumple Zone Design

Engine Cradle Drops



FRAME RAIL CONSTRUCTION

- Found primarily on light to heavy trucks and SUV's
- Components bolt onto frame rails.
- Great strength, but heavy

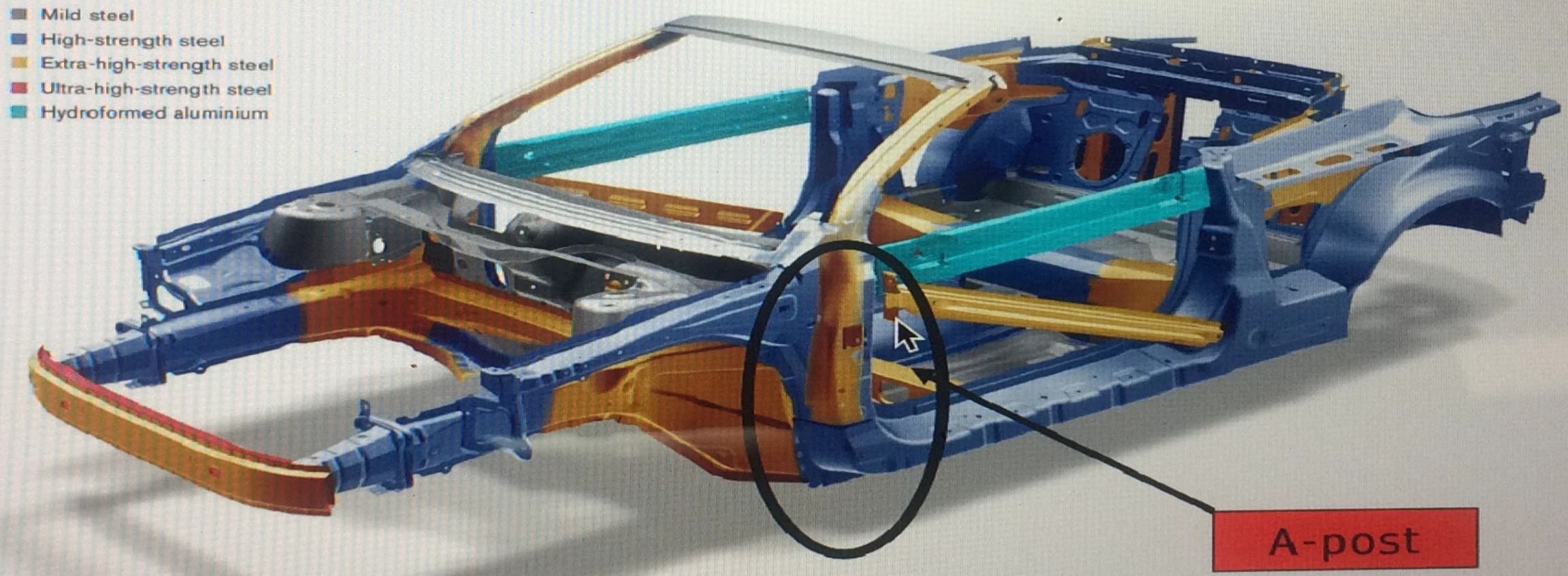


UNI-BODY CONSTRUCTION

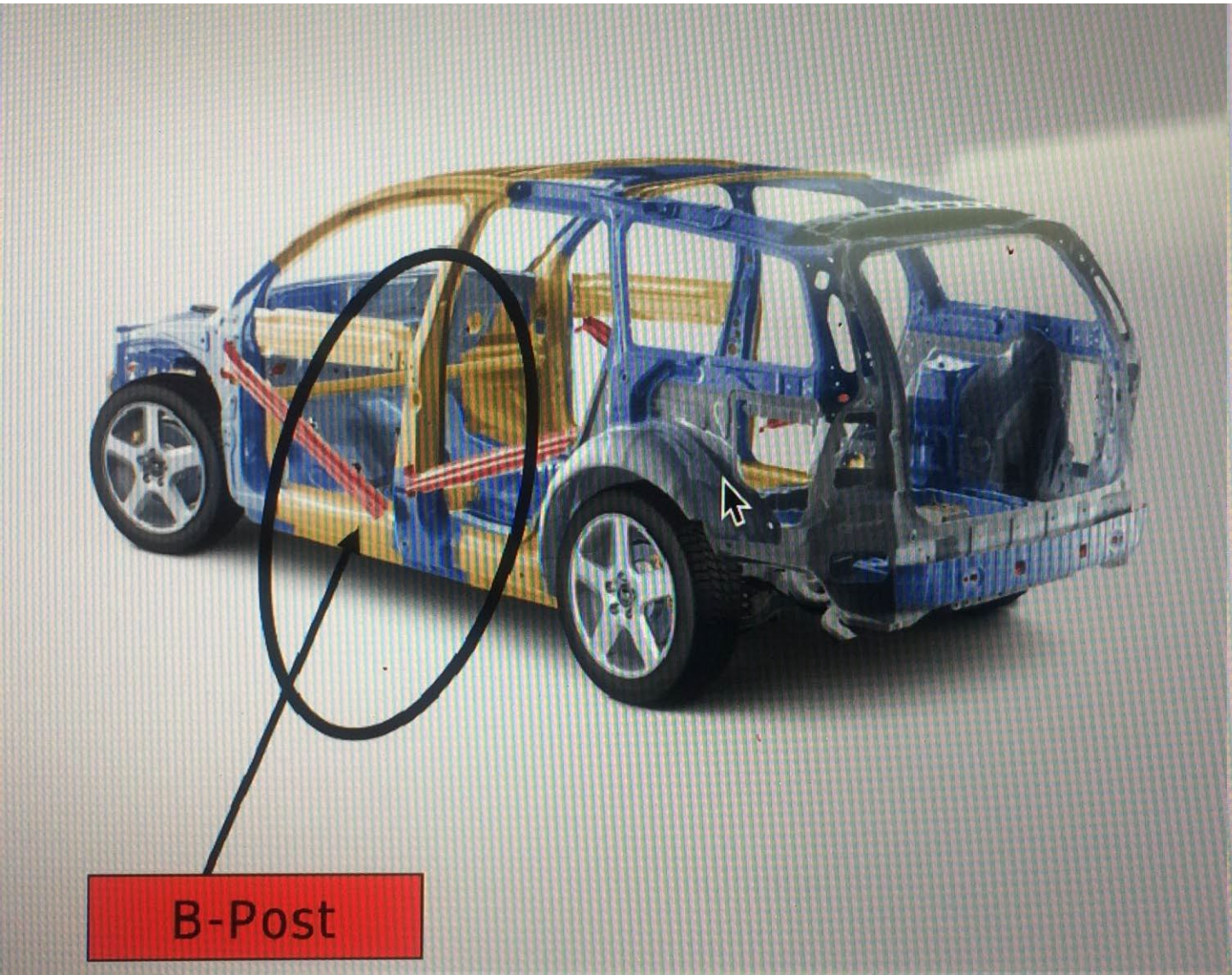
- Uses principle of truss to support vehicle

- Top cord (roof) holds up bottom cord (floor) by transferring load to either end while supporting middle with center (B) post

A – Post Construction

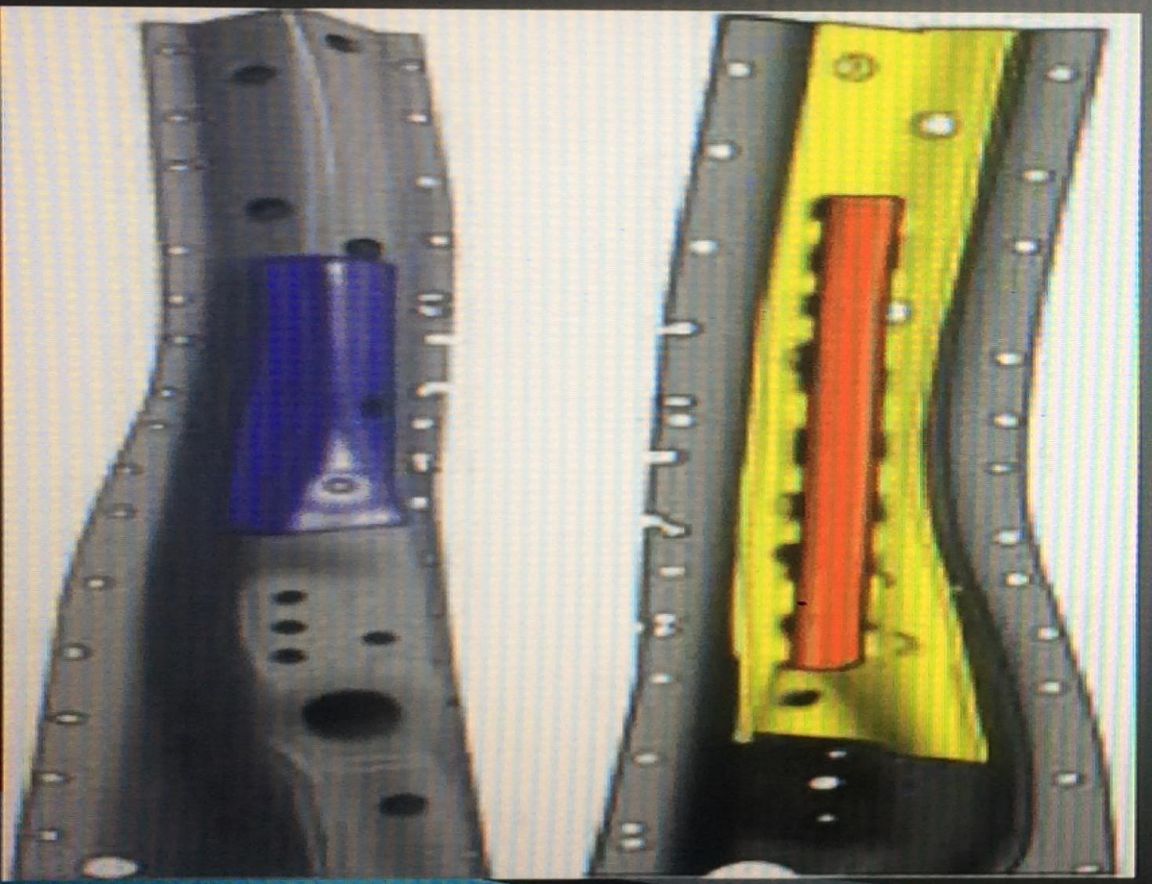


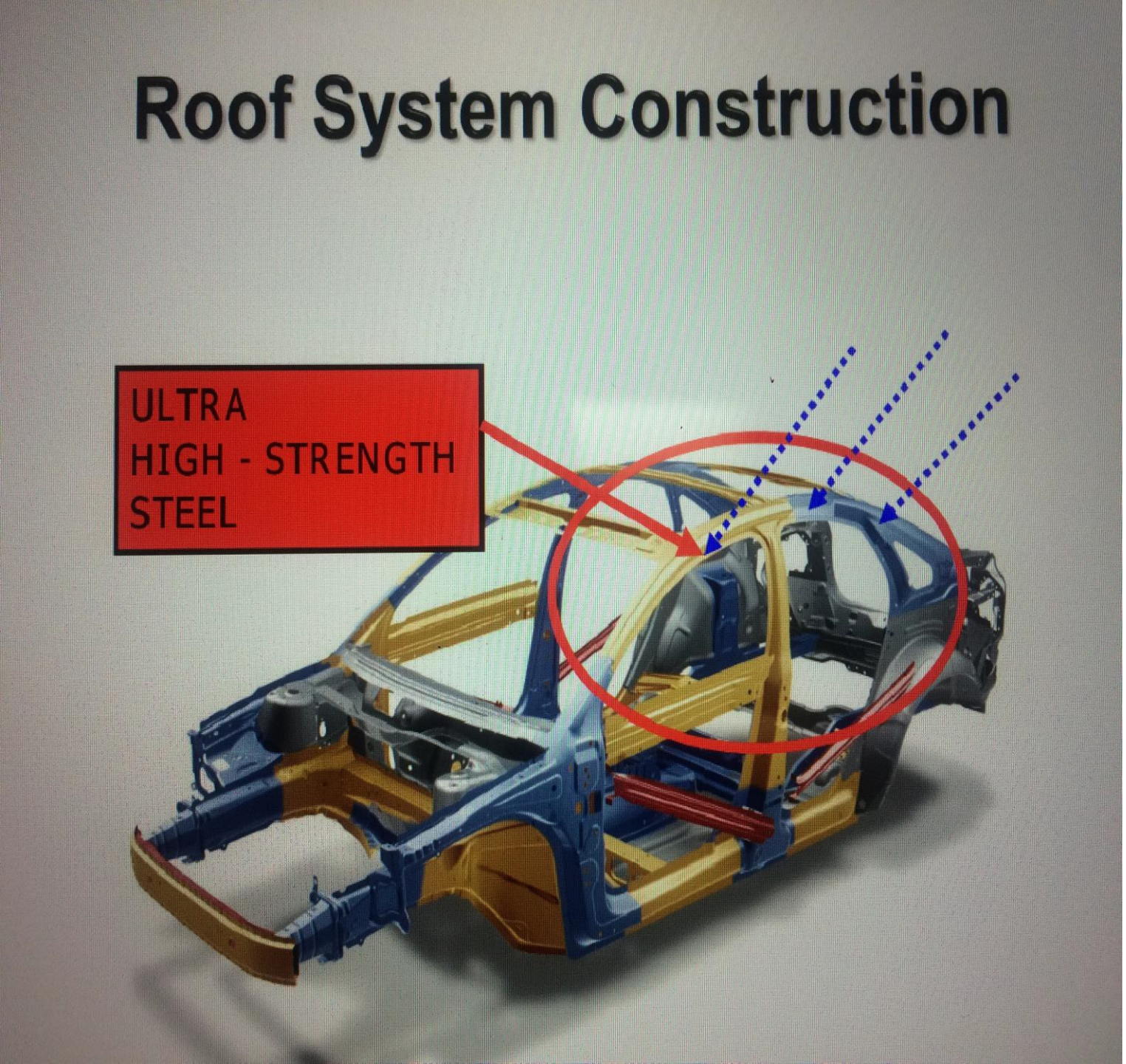
B-POST CONSTRUCTION



How many layers of steel do you see in this B-Post?

A & B POST REINFORCEMENTS





- Designed to hold 1.5x weight of vehicle
- Removal vs. flapping back
- Sun roof, luggage racks = strength

AIRBAG GENERAL INFO

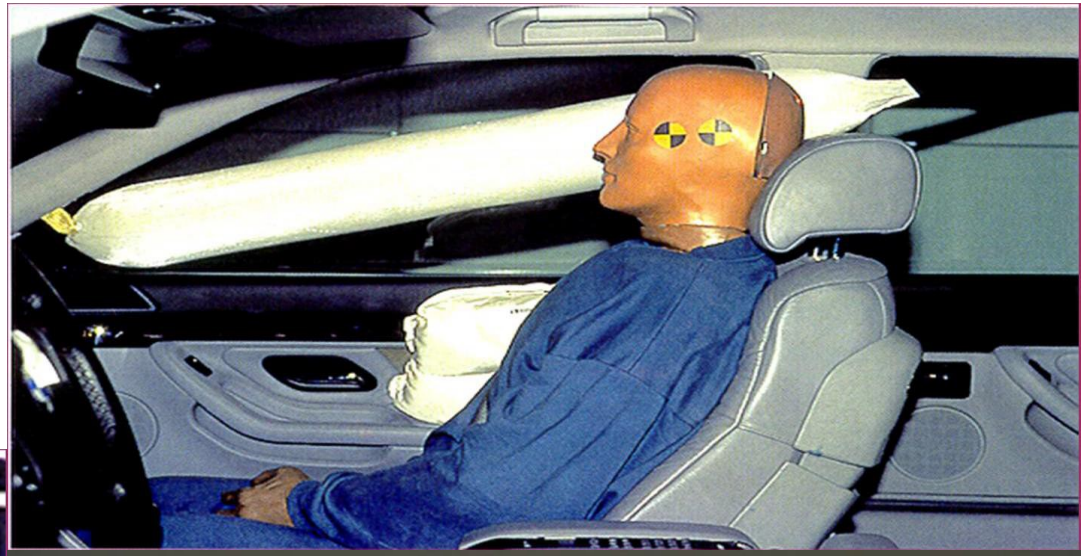
- Airbags are activated by deceleration. If airbags deployed, check for deceleration injuries.
- Airbags are hot switch technology. Remove key and you are safer.
- Yellow wire indicates airbag circuitry, do not cut!
- It is almost impossible to keep up with the locations of SRS in different model cars. Use the 5-10-20 rule to stay safe.
- 5" from the door,10" from the steering wheel, 20" from the passenger side airbag.
- Capacitors drain in as little as 5 minutes or up to 20 minutes if you disconnect the 12v battery.

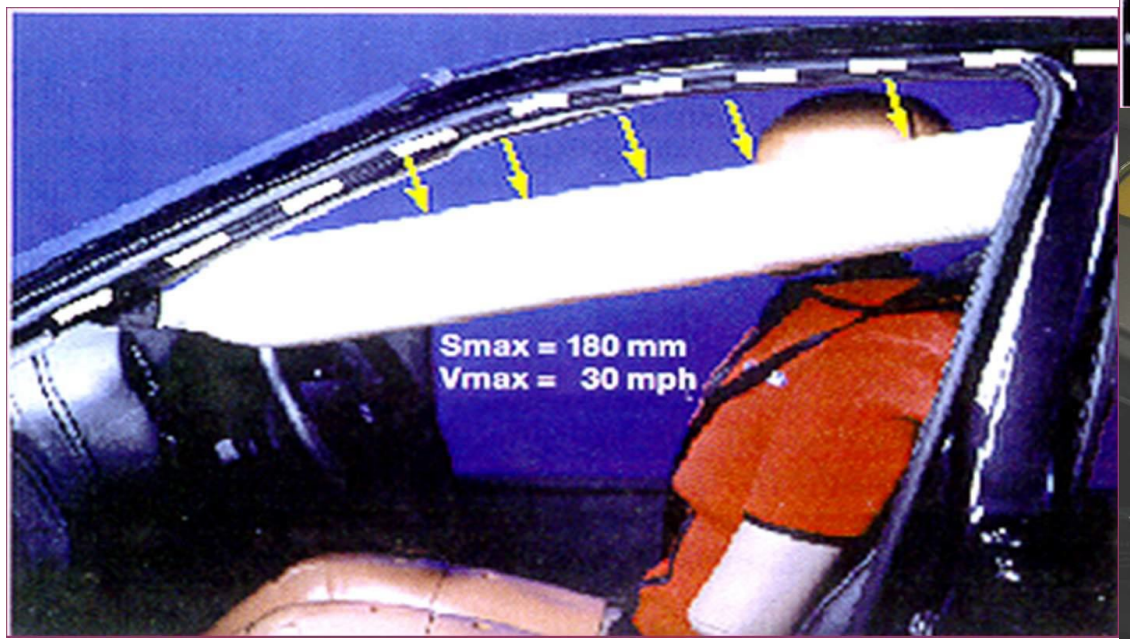
SUPPLEMENTAL RESTRAINT SYSTEMS

- This is the air bag control module
- Appears in different places in cars, even in same model year
- Applying force to this unit will cause bag to deploy

HEAD PROTECTION SYSTEMS

- All roof systems are stored gas inflated.
- Inflated curtains offer additional protection in roll-over accidents and are larger then front bags.
- The inflator is located in the “C”post and uses compressed gas.





STORED GAS INFLATOR SYSTEMS

- Contains pressures up to 4,500 psi.
- Contains argon and helium
- Deploys in 25/1000 of a second.
- Remains inflated for 5 seconds.
- Found in A and C posts & roof-rail.
- Easy to cut through, offer no resistance.
- No pop-off valve if on fire.

- The days of cutting and prying anywhere on a car are over.

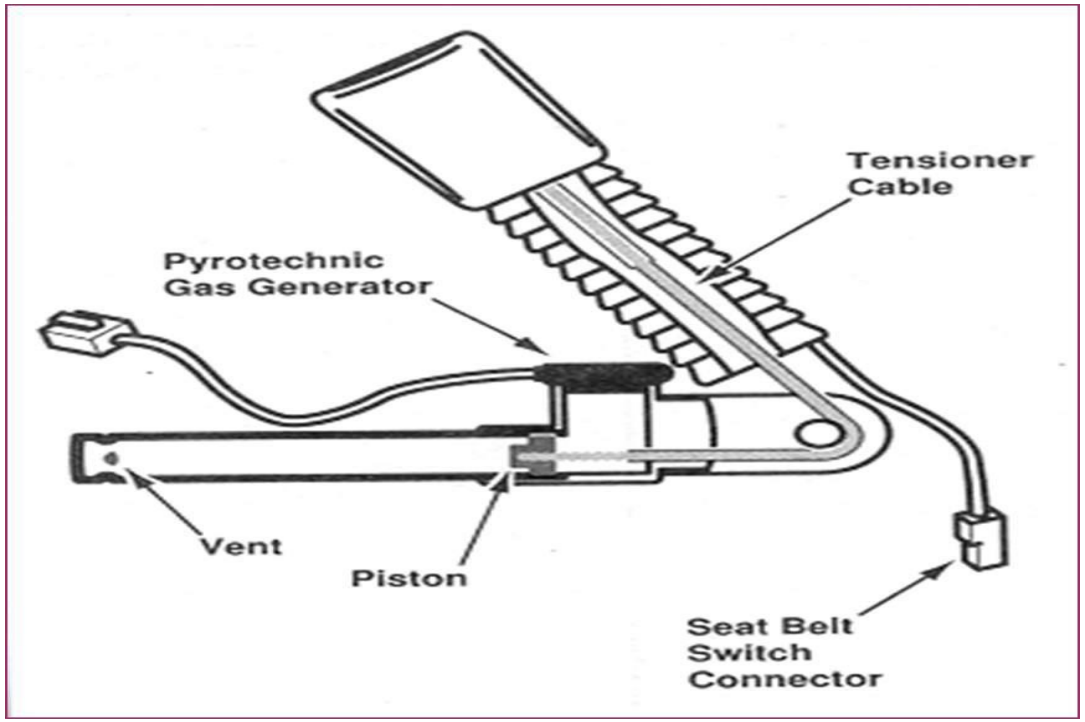
- We must identify the location of SRS modules and component location ***before*** and extrication procedures are initiated.

- Use the ***PEEL AND PEEK*** method.

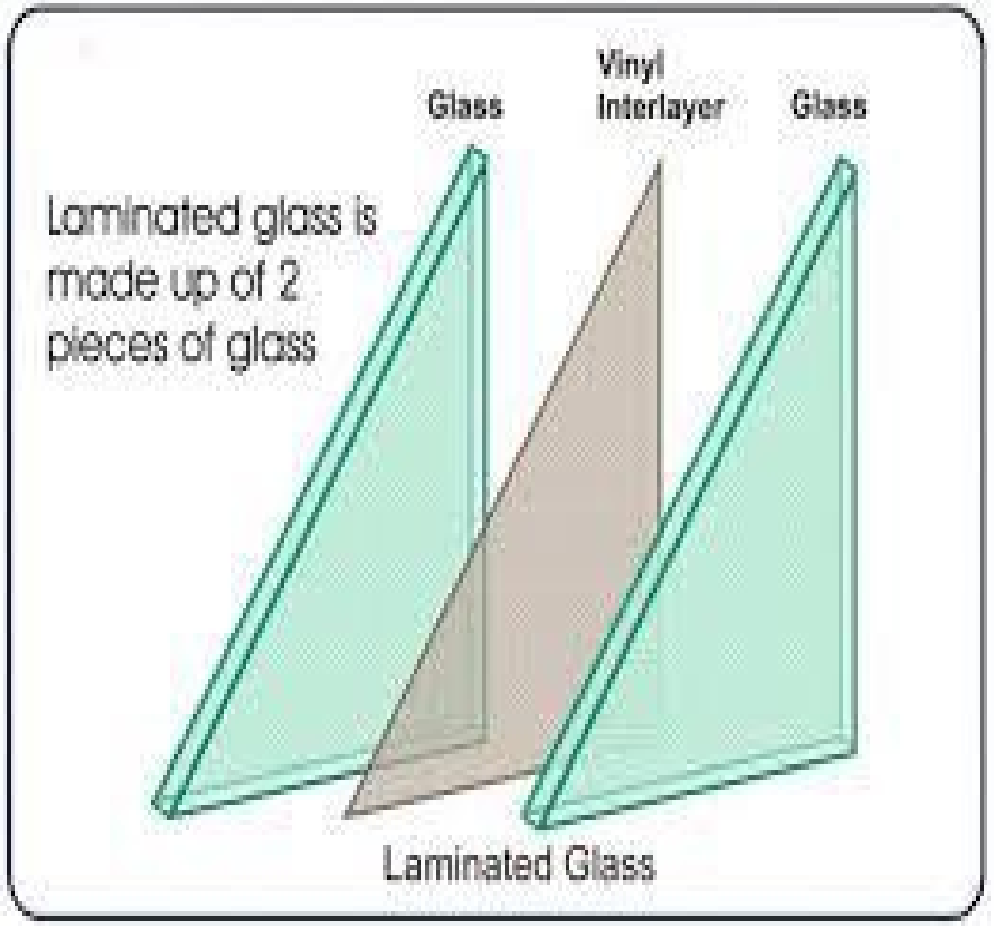
DOOR MOUNTED SENSORS

- Side impact sensors are located in the lower center portion of the front door or in the lower portion of the B-pillar post.

SAFETY BELT PRETENSIONERS



BREAKING GLASS!!!



NOTES ABOUT GLASS REMOVAL

- It is the most common contaminate of patient's wounds
- Invisible to X Ray
- Once mixed with blood impossible to see visually
- Cannot be irrigated out of wounds
- Wound usually heals with glass silvers/chips still inside with continues to irritate/delay healing until the skin grows out and naturally sloughs the glass off

** **We are #1 priority! Wear dust mask as a minimum before cutting glass**

MOST COMMON POSITIONS

1. Upright
2. On a side
   - Less than halfway
   - More than Halfway
3. Upside down
   - On their roofs
   - Nose down

STABILIZATION

- Involves increasing the number, size and total area of contact between the vehicle(s) and the ground pavement.
- Increase the surface area and number of contact points between the vehicle (s) and the ground to prevent to prevent further movement.
- Orientation of vehicles will determine stabilization needs

TERRAIN CONSIDERATIONS FOR STABILIZATION

- A Steep, muddy embarkment will obviously necessitate different stabilization methods than will flat, dry ground. A car upright on flat pavement will be relatively simple to stabilize compared to a car overhanging a freeway overpass.

- Understand the potential for vehicle movement

DIRECTIONAL MOVEMENT DURING STABILIZATION

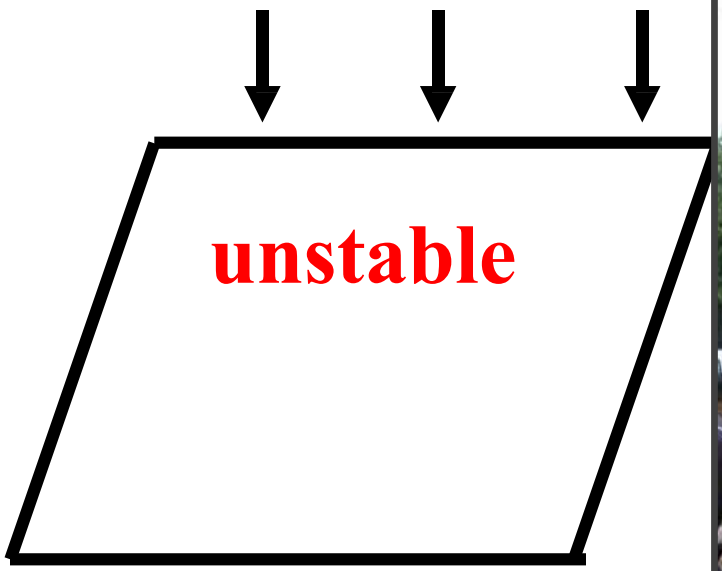
- Horizontal Movement: Vehicle moves forward or rearward on its longitudinal axis or moves horizontally along it's lateral axis.
- Vertical Movement: Vehicle moves up and down in relation to the ground while moving along its vertical axis
- Roll Movement: Vehicle rocks side to side while rotating about on its longitudinal axis and remaining horizontal in orientation
- Pitch Movement: Vehicle moves up and down about it's lateral axis, causing the vehicle's front and rear portions to move left or right in relation to their original position.
- Yaw Movement: Vehicle twists or turns about its vertical axis, causing the vehicle's front and rear portions to move left or right in relation to their original position.

THEORY OF VEHICLE STABILIZATION

- **No Vehicle is Stable Until it Has Been Stabilized!**
  - Stabilization is a continuous process
- There is no one right way to secure vehicle, just a lot of wrong ways
- If you lift an inch, crib an inch
- You should always ask - "Does this look stable?"

STRENGTH IS IN THE SHAPE

BOX = 360°



triangles

adding cross brace divides area into 180°

STABILIZATION EQUIPMENT

- High-pressure air bags
- Low-pressure air bags
- Jacks
- Struts
- Hydraulic tools
- Come-alongs
- Winches
- Cribbing

What Else?

Think Outside The Box

WORKING WEIGHT

- Small Sized Cars =2,600lb
- Midsized Cars = 3,500lb
- Large Sized Cars = 4,400lb
- Small Trucks = 3,300lb
- Midsized Trucks = 5,300lb
- Large Trucks = 6,600lb

CRIBBING

- Dry maple could no longer hold a load of 60.tons. No catastrophic failure accrued.
- Pressure treated southern yellow pine compressed 3 1/2in. before failure at 20 tons. At 21 tons the entire stack could no longer hold the maximum load.
- Eastern spruce compressed 3" in before failure at 20 tons. At 21 tons the stack could no longer hold the maximum load.
- Semi dry soft maple compressed 1 1/2 " and held 60 tons. Pressure was increased but held at 60 tons. The stack was able to hold 60 tons as it was compressed.
- New red maple compressed 1 1/2 " and held 63 tons.

CRIBBING POINTS

- Box Cribbing: 4x4s laid side by side, the completed stack is in firm contact with vehicles frame. It is important to build crib as square as possible.
- When building a box crib for use with the air bags, build a solid top layer to support the air bags
- Step Cribbing: Used as a 4-point stabilization for the vehicle. Constructed of a 2 x 6 with 2x4 staked on top each 5 inches shorter than other.
- True Platform: It is the most material intensive cribbing. It is a solid platform, constructed like a box crib, but the lumber is laid side by side across each layer, so no void spaces exist within the crib. Not usually used in auto extrication but many times is necessary in heavy rescue.

CRIBBING

4 POINT

- 4x4” = 24,000 lbs. strength

  (6,000 per point)

- 6x6” = 60,000 lbs. strength

  (15,000 per point)

BOX CRIBS

2x2

3x3

Sloped

4" Over Hangs.

3:1 Height to Width

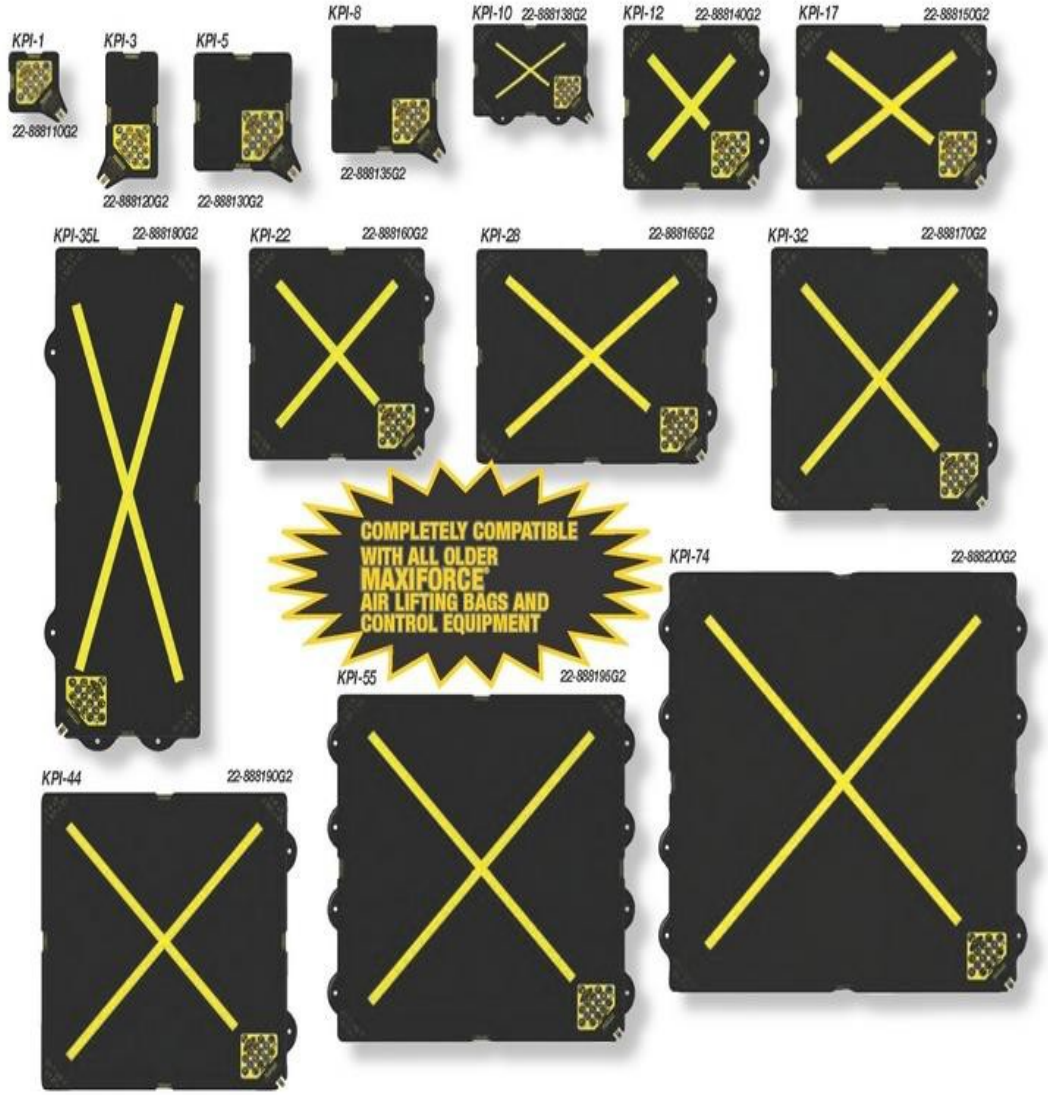
BOX CRIBS

1:1 height is a safe rule when not building a perfect box


RS6B

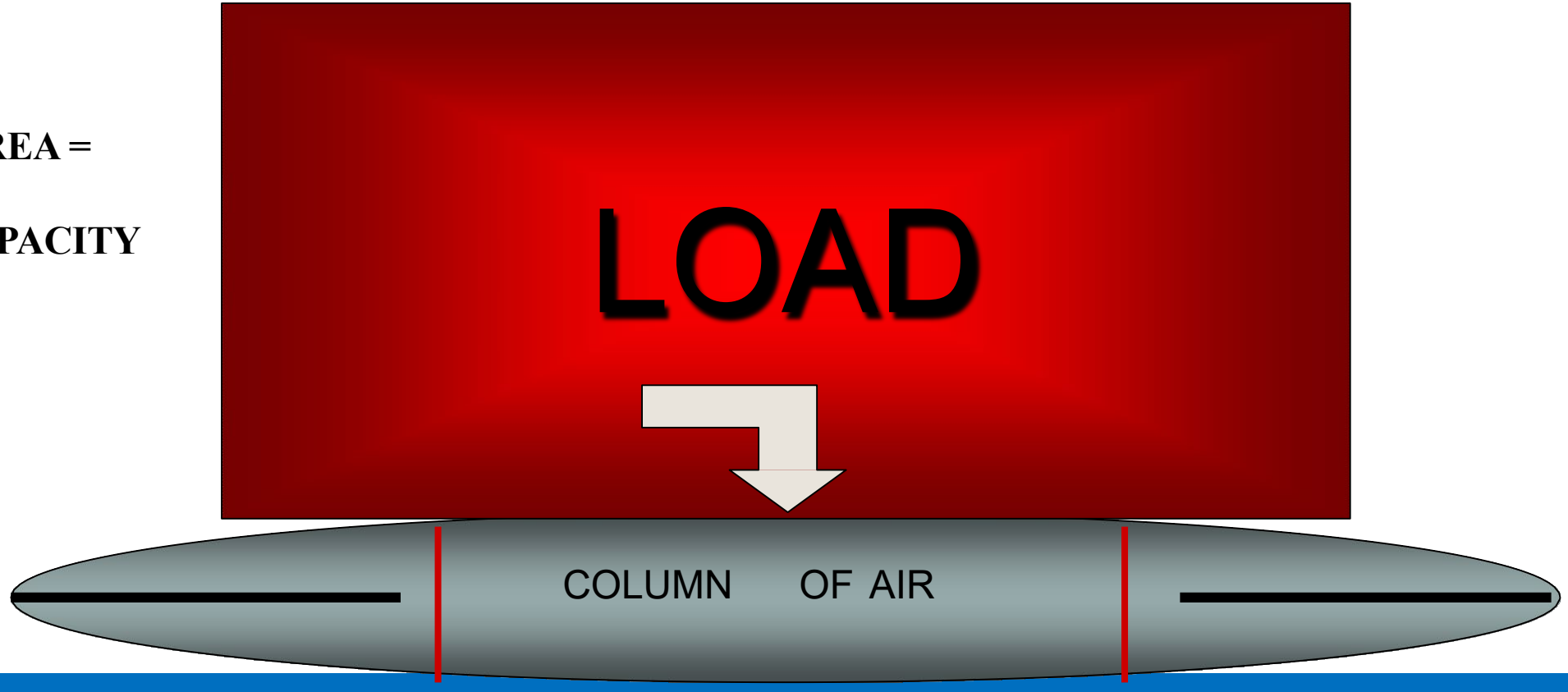
HIGH PRESSURE AIRBAGS

- Must be understand that these are lifting devices and not stabilization devices alone, and as such De-Stabilize objects when ever used in a lifting evolution
- Rated Capacity is at 2” inflation.
- Try and use the largest bag possible
- If there is room to stack…Do it.

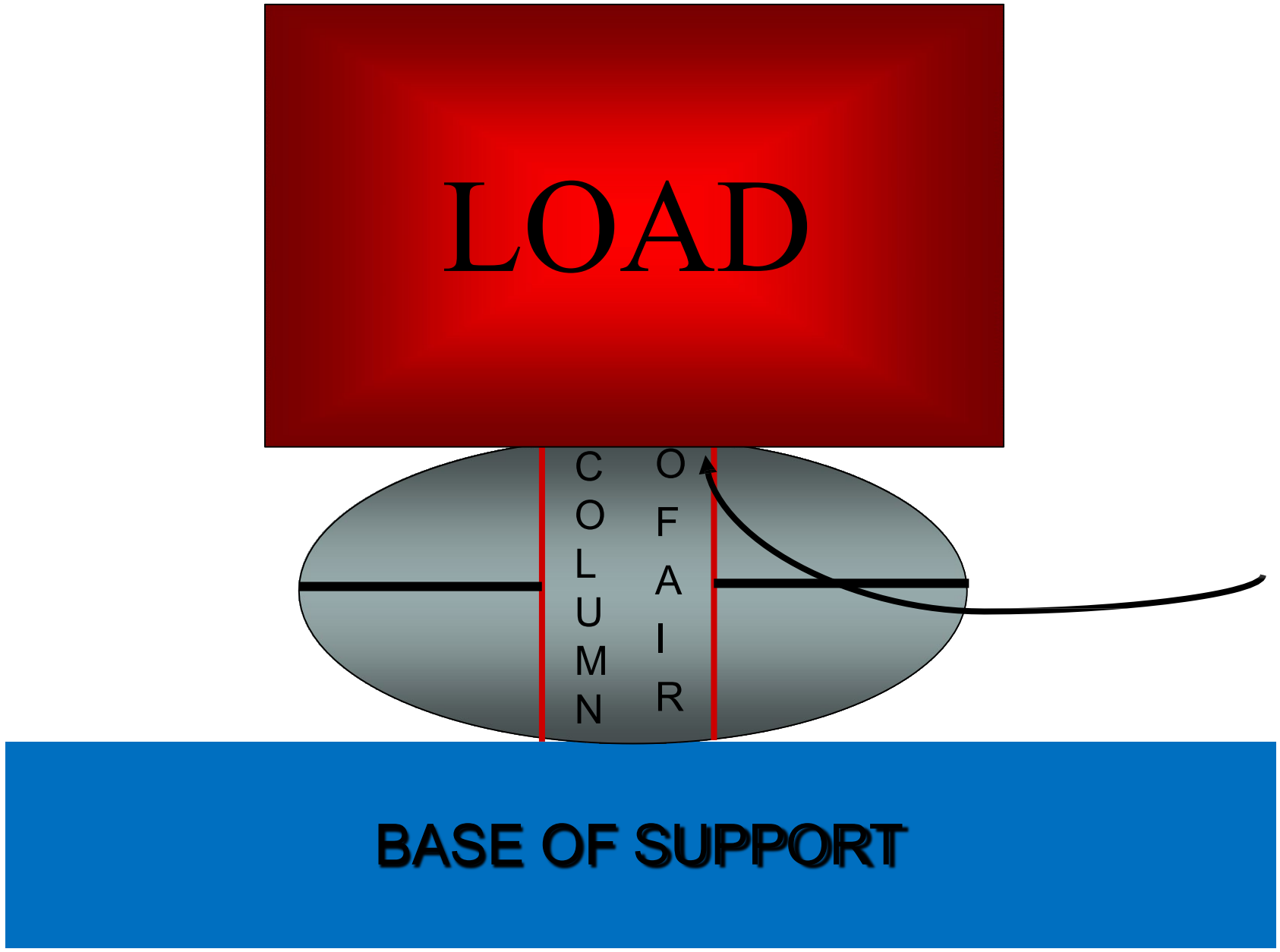


HIGH PRESSURE AIR BAGS

INCREASED SURFACE AREA = INCREASED LIFTING CAPACITY



HIGH PRESSURE AIR BAGS



AIR BAG INFLATED

REDUCED SURFACE AREA CONTACT

HIGH PRESSURE AIR BAGS

Stable → UNSTABLE

Lowest capacity bag is the total lifting capacity

- Inflate Bottom Bag First

”Footballing”

SIDE BY SIDE HIGH PRESSURE BAGS

LOW PRESSURE AIRBAGS

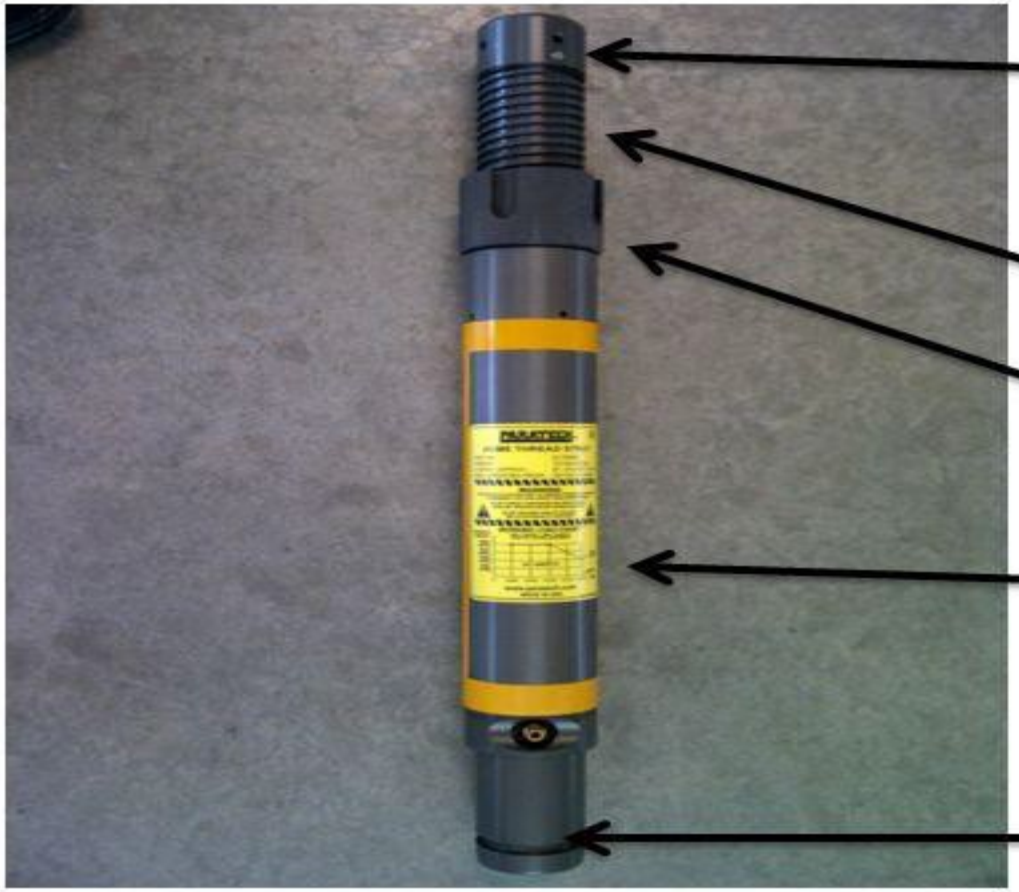
- Uses 14 psi
- Used to lift lower weights
- Can lift a great height (up to 43”)
- Must be fully inflated for max lifting capacity

LOW PRESSURE AIR BAGS

Unstable ***Stable***

AIR BAG CONTROLLERS

PARATECH THREADED STRUT



end plate or extension attachment point (this is where the strut meets the vehicle or structure)

2 1/2" inner threaded shaft

Threaded lock nut

3" outer tube

Base plate attachment point

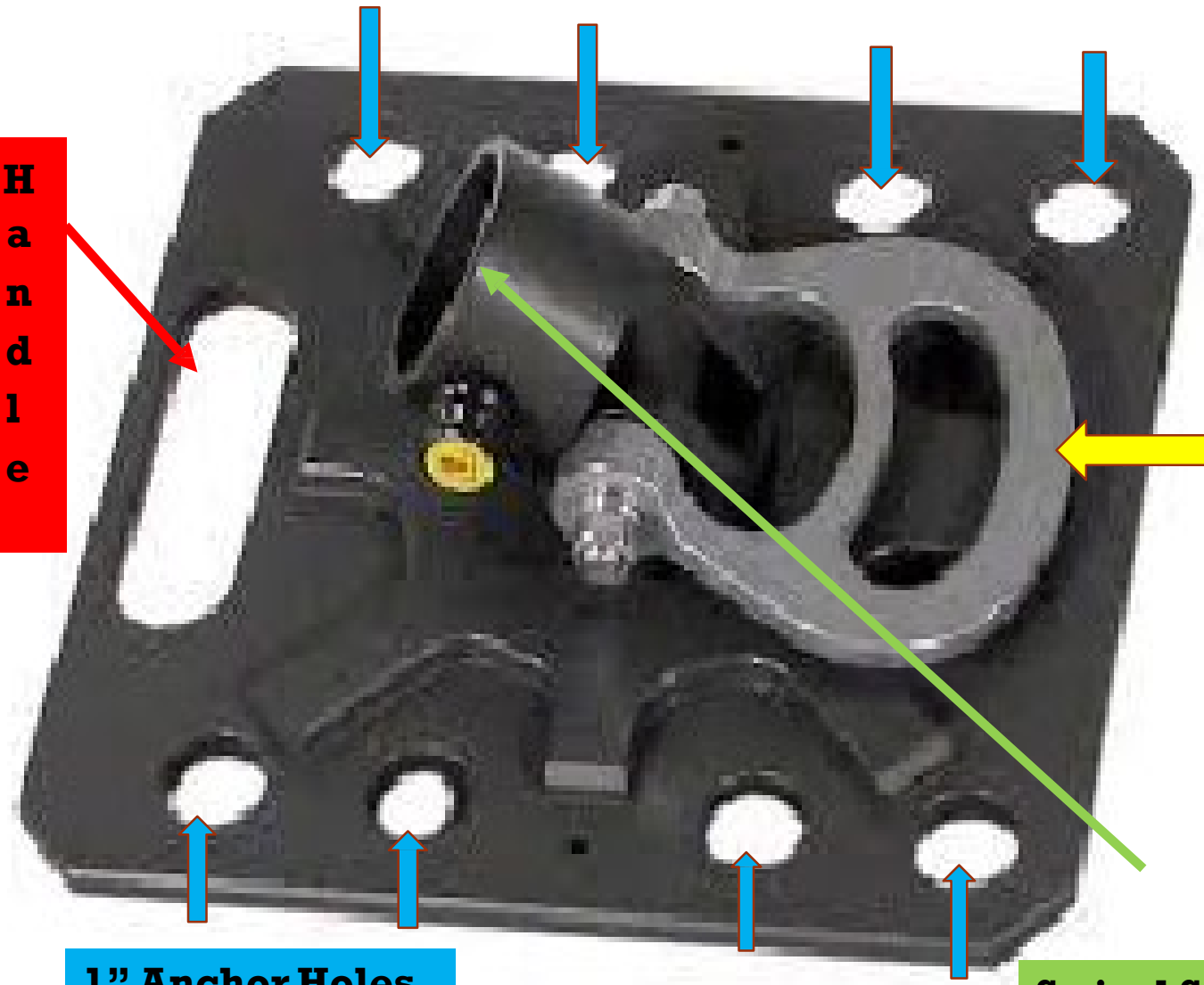
EXTENSIONS

- 3”,6”,12”,24”

- Can only use 2 Extensions at a time

  To Total 36” max length

BASE PLATE / TIP



Handle

Anchor Ring

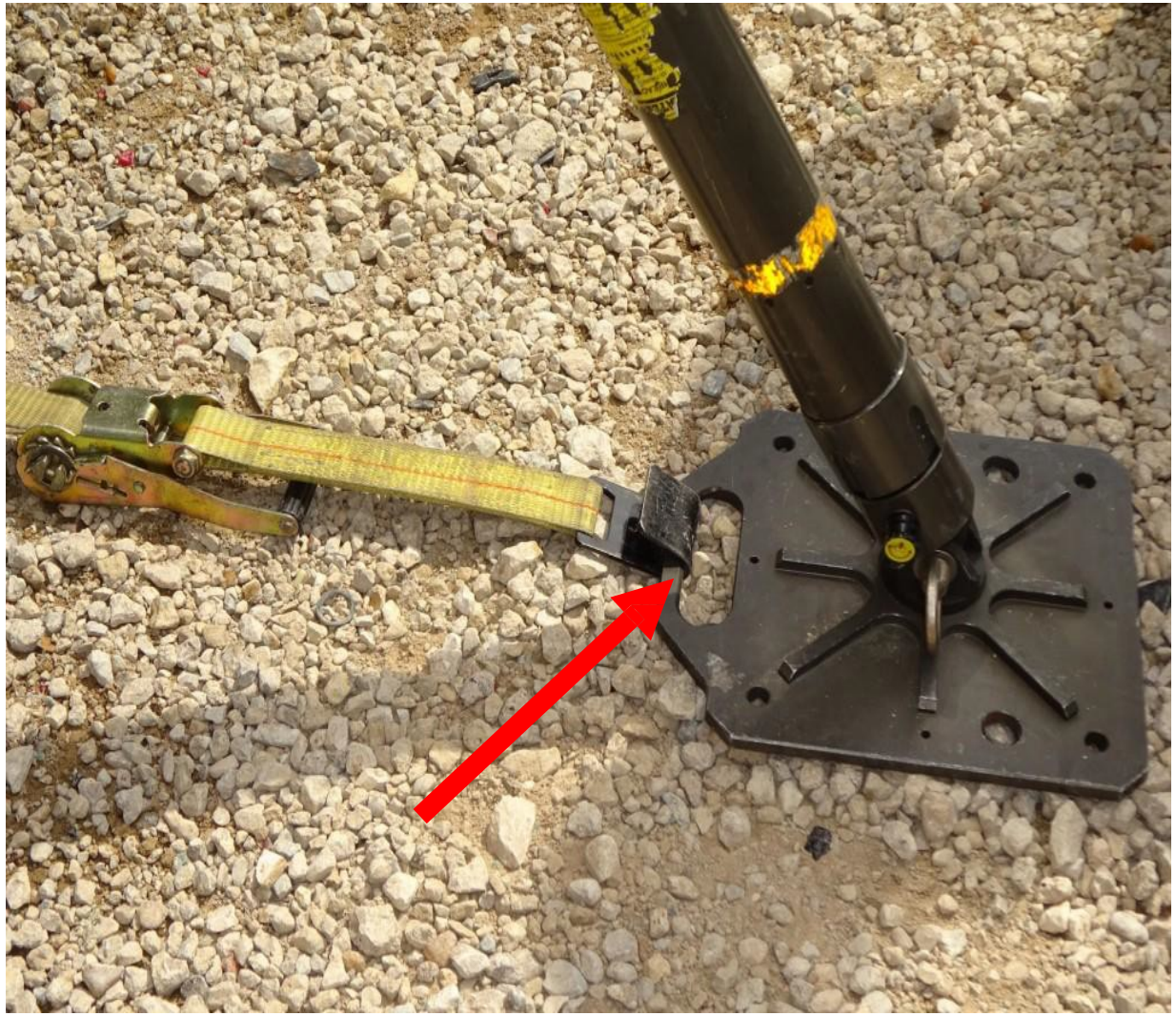
1" Anchor Holes

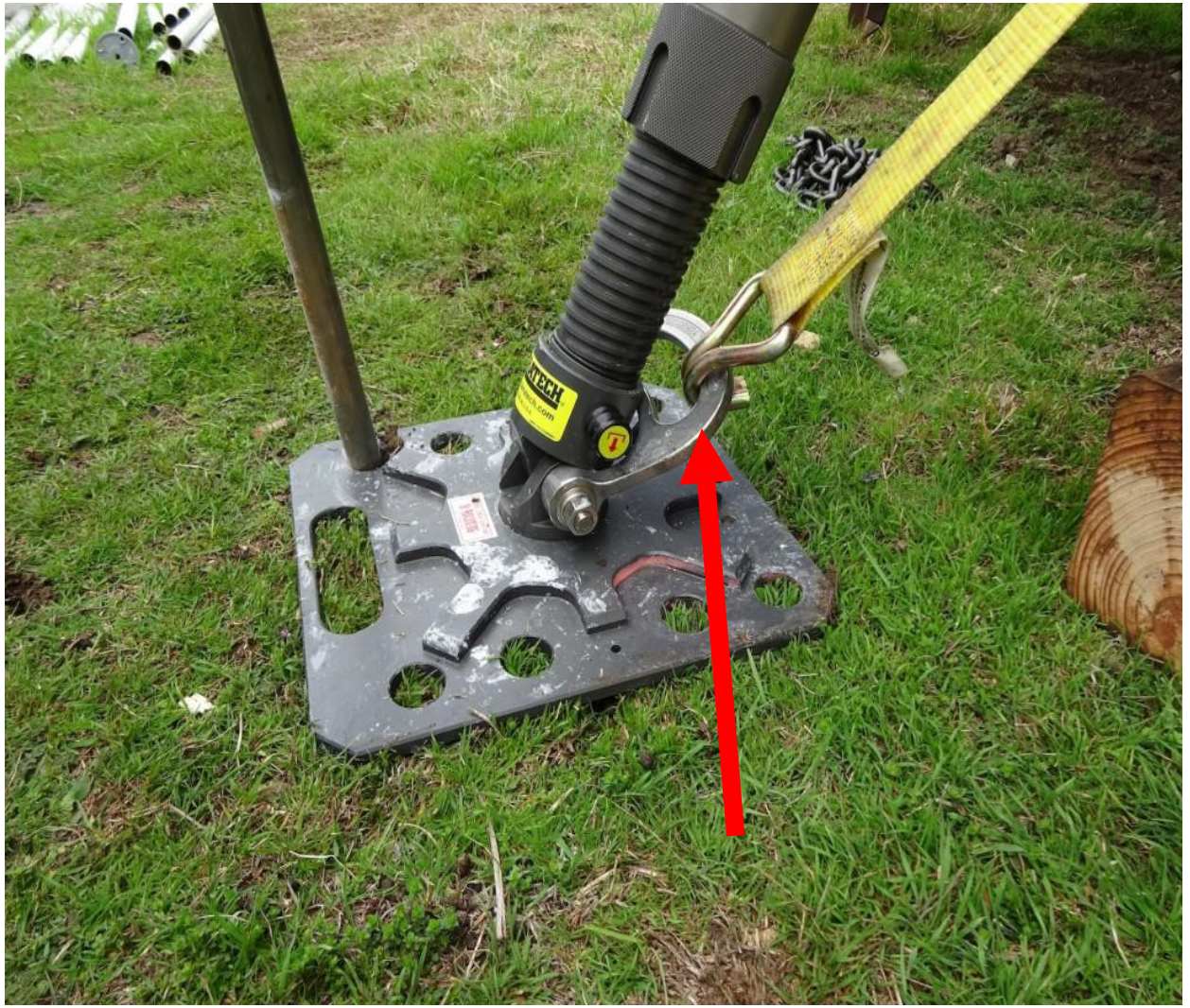
Swivel Strut Insert

Multi-use "V" Tip

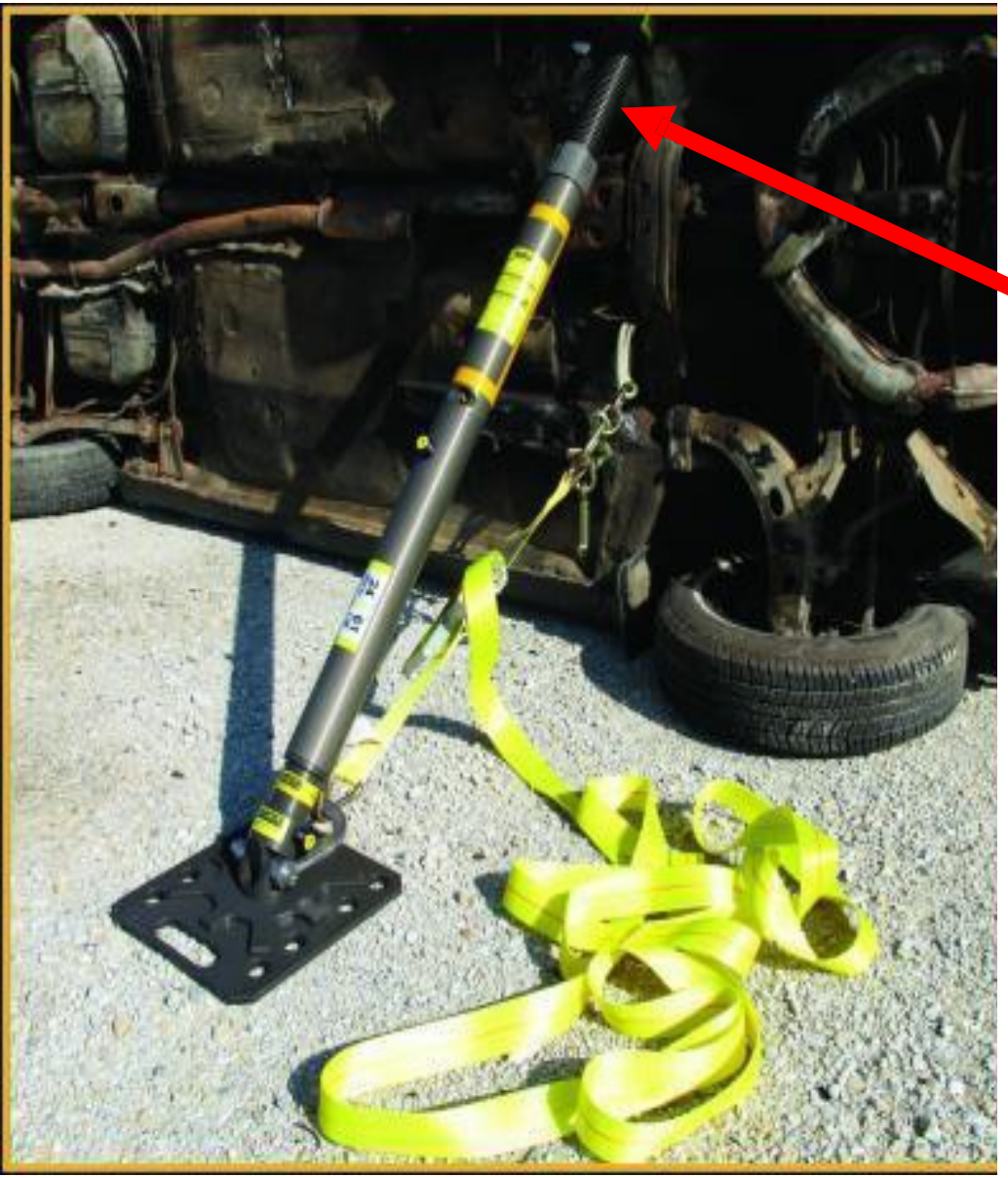
Chain Lock Notch

?RIGHT WAY / WRONG WAY?



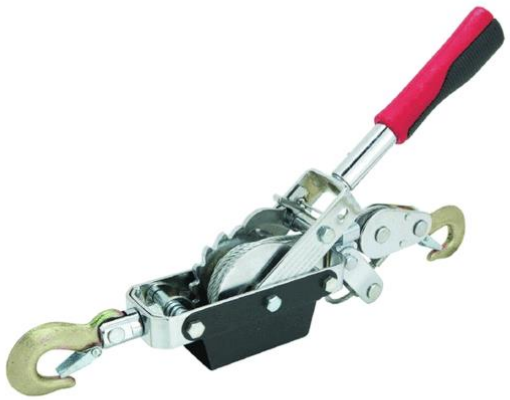


?RIGHT WAY / WRONG WAY?



Threaded Shaft

OTHER STABILIZATION TOOLS



Cable Come Along – Can be used in conjunction with a substantial anchor point to eliminate further vehicle movement

OTHER STABILIZATION TOOLS

- Chains, cables, Winches, clings, webbing, rope

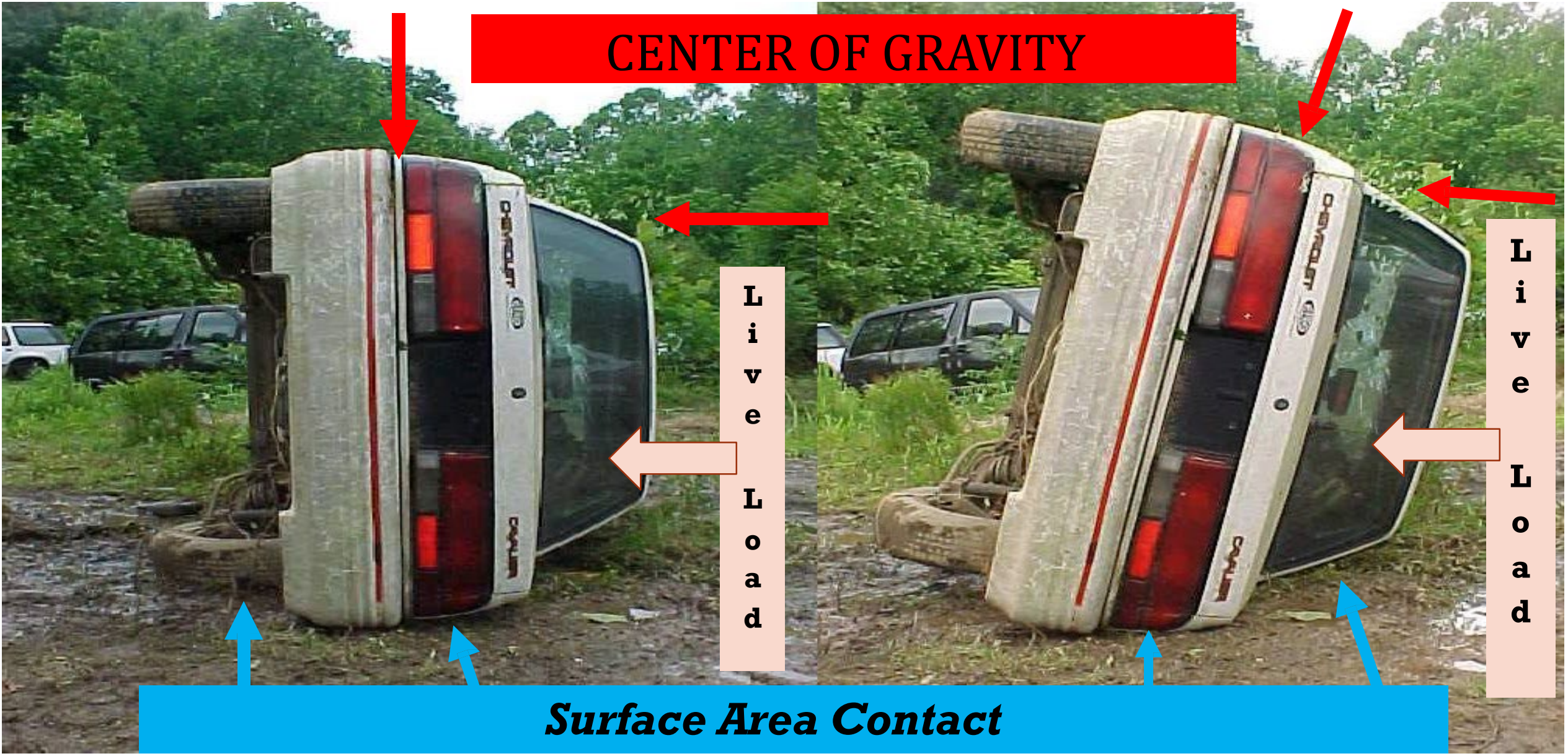
1. All can be used to attach an unstable vehicle to a substantial anchor point to eliminate movement

**WARNING: These components have different strength ratings, resistance to abrasion and susceptibility to chemical degradation

Any system is only as strong as its weakest component !

VEHICLE STABILIZATION

SIDE STABILIZATION

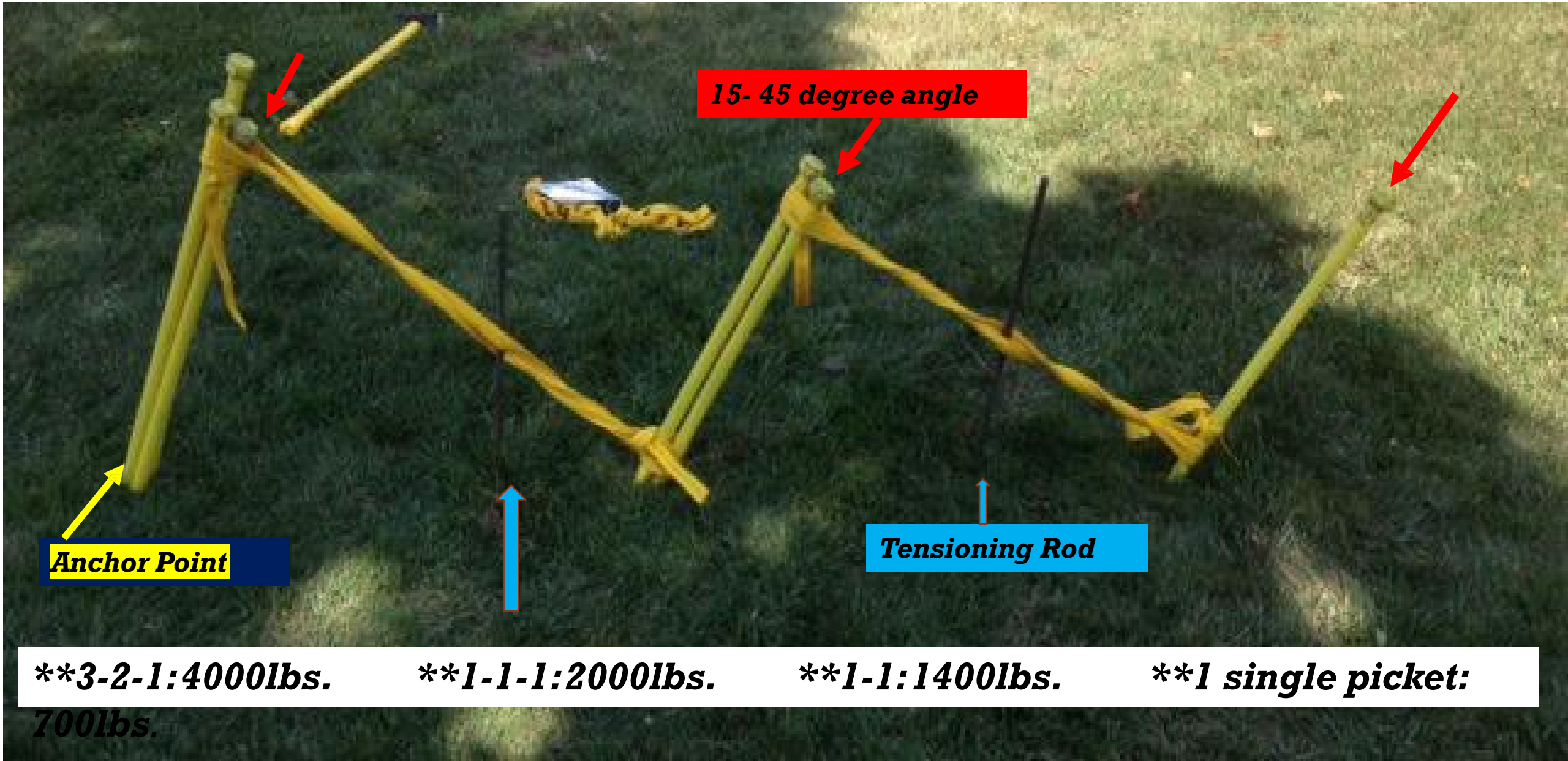


SIDE STABILIZATION

"GROSS" STABILIZATION

SIDE STABILIZATION

PICKET ANCHOR SYSTEM



**3-2-1:4000lbs. **1-1-1:2000lbs. **1-1:1400lbs. **1 single picket: 700lbs.

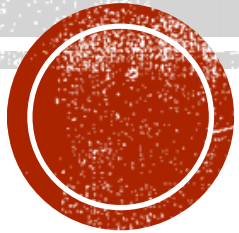
SIDE STABILIZATION

ROOF STABILIZATION

Resting on the Roof

Nose Down

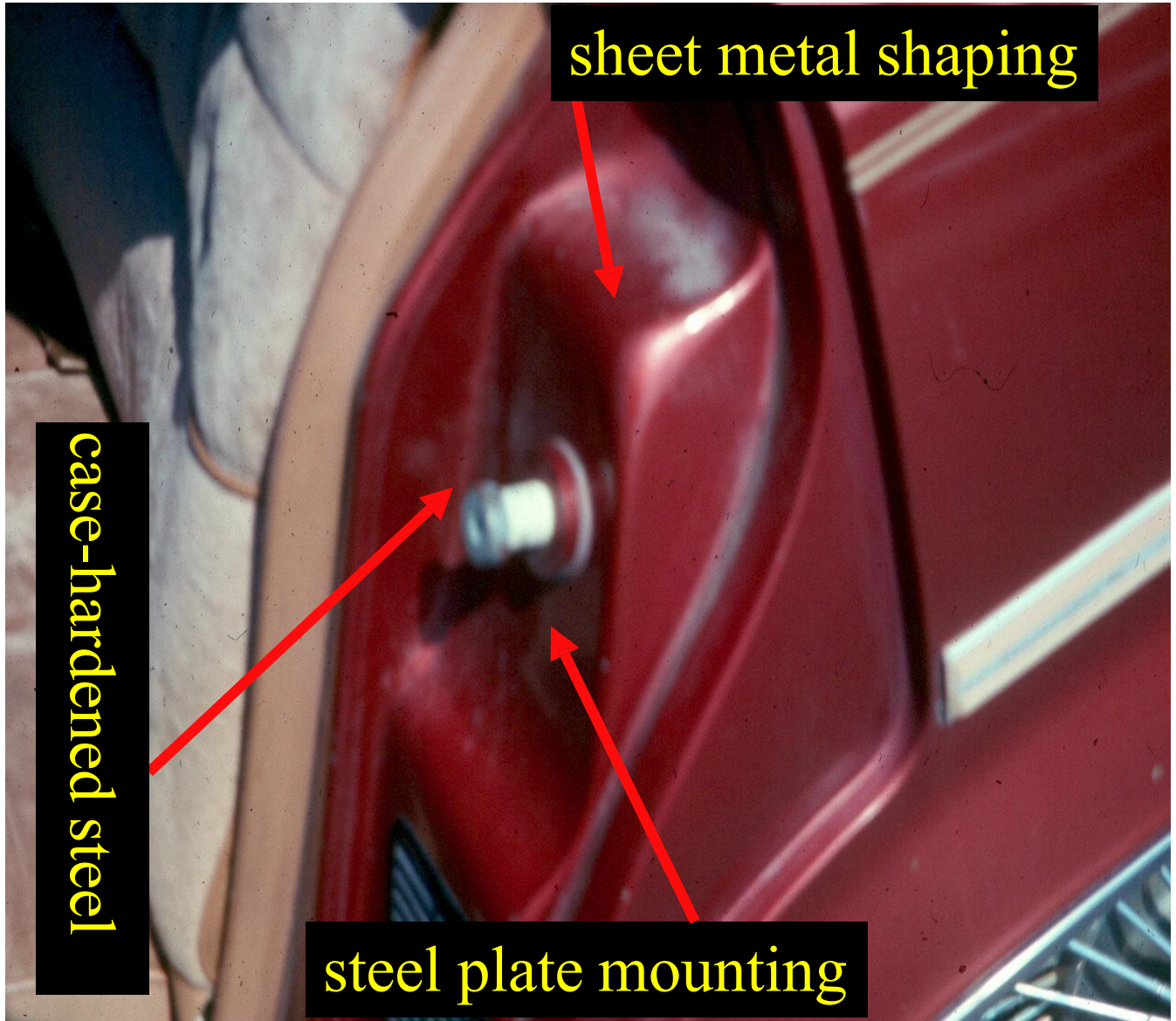
THESE BASIC METHODS ONLY SERVICE AS A STARTING POINT IN YOUR STABILIZATION EFFORTS AND MAY EVOLVE INTO MORE COMPLICATED METHODS AS THE EXTRICATION CONTINUES



BOLT SIDE

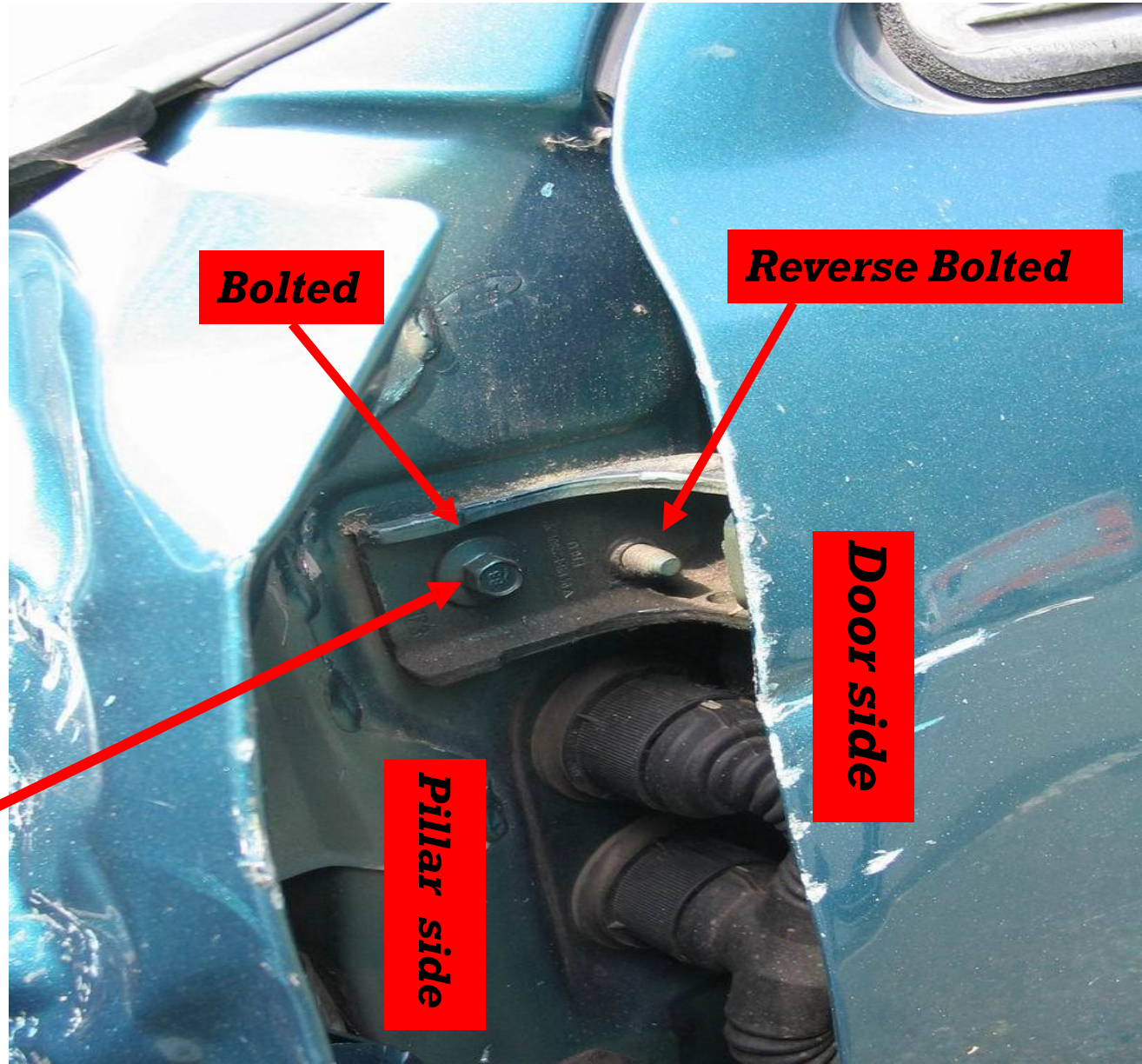
LATCH BOLT. (AKA “NADER BOLT”).

- Has great strength.



HINGE SIDE

- Hinge attachments are either:
  - Bolted –Welded-Reverse bolted
- Look at both pillar and door attachments
- Deep-well socket set (12mm or 13mm)



DOOR REMOVAL WITH HAND TOOLS

1. Size up the door.
2. Identify the strength's and weaknesses
3. Overcome the strength's and taken advantage of the weaknesses
4. Create purchase points

** Remember Your Objective**

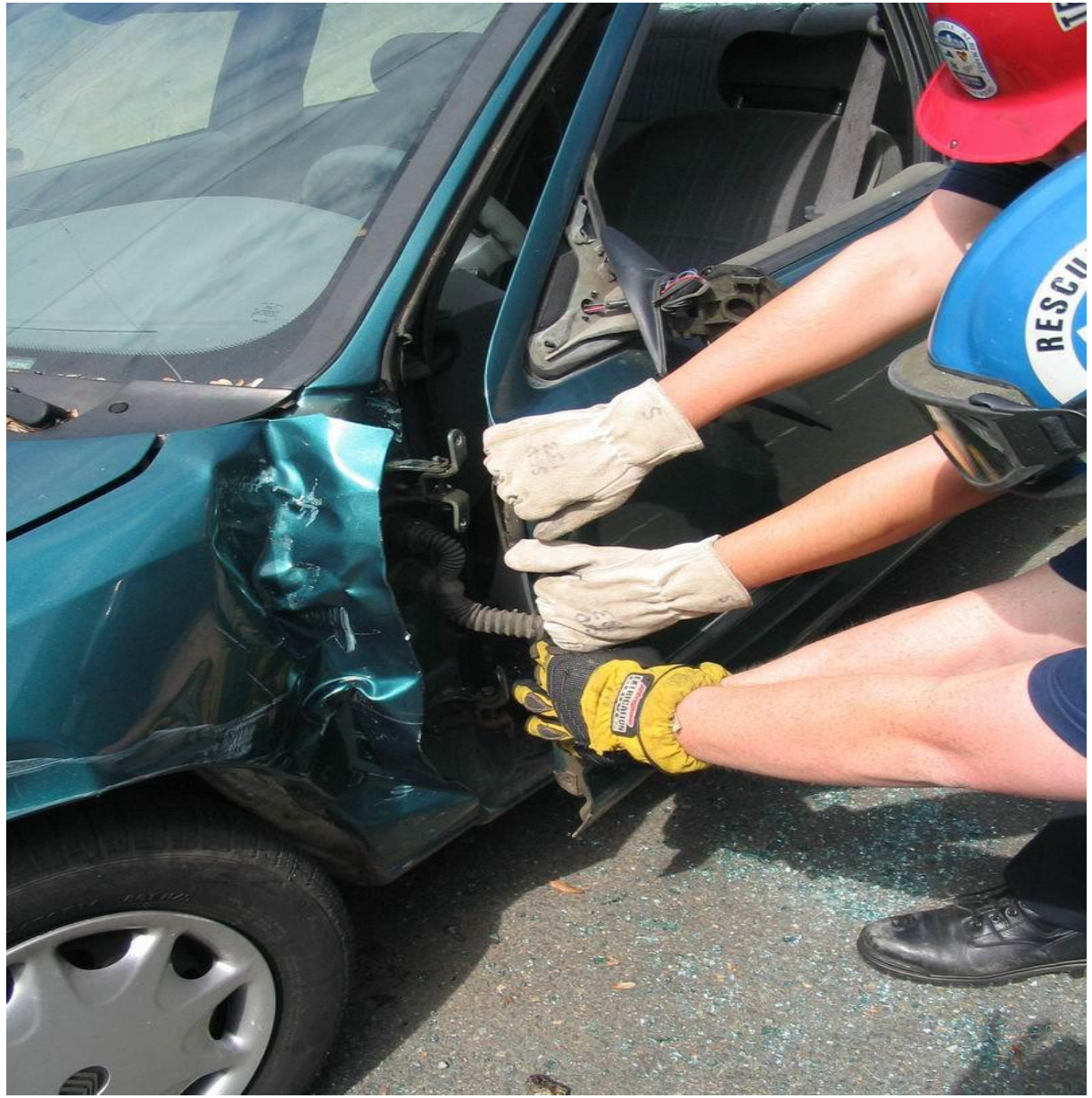
DOOR REMOVAL WITH HAND TOOLS

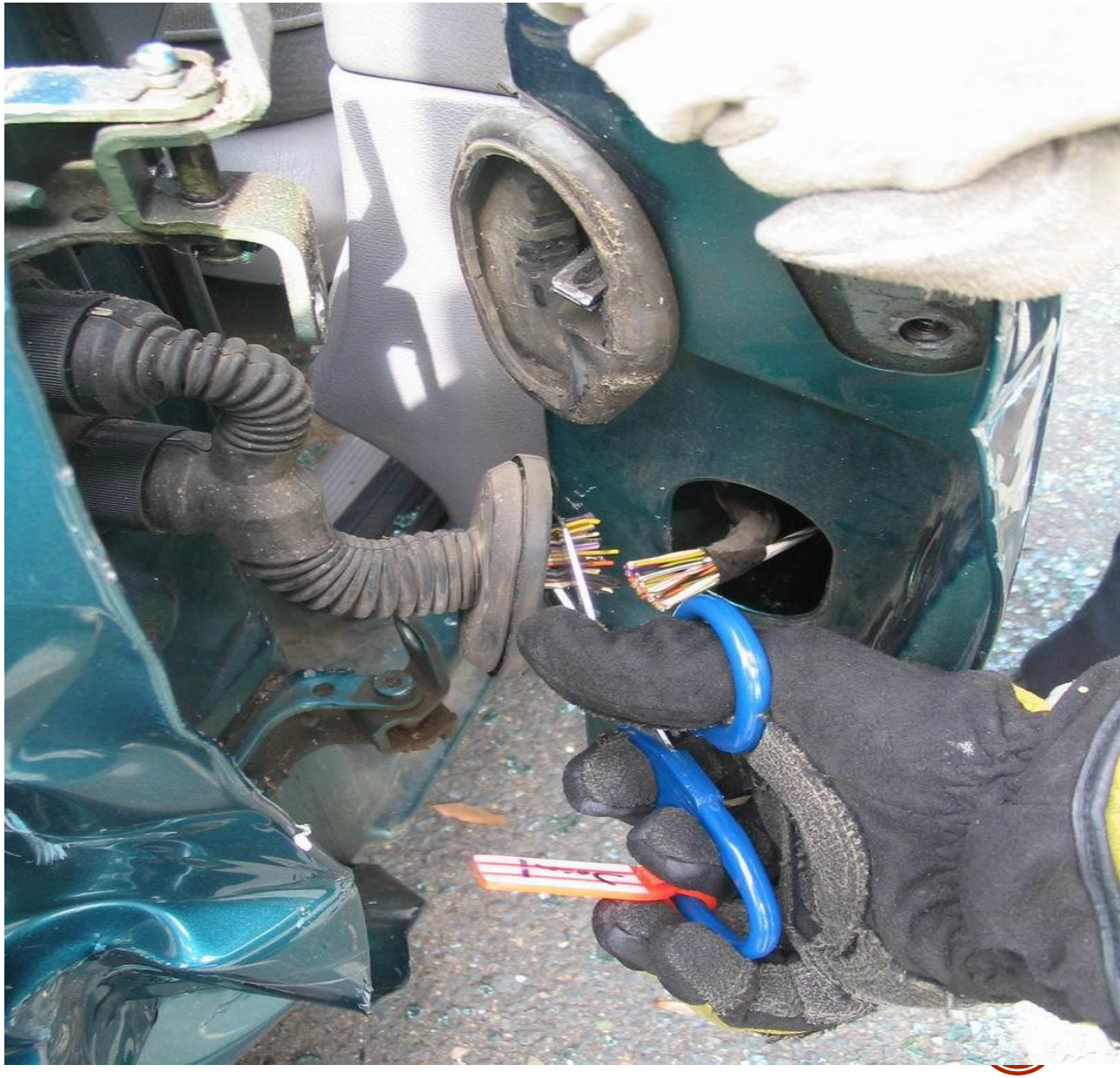
- Create a Gap to Expose the Hinges.

*What's your objective?

DOOR REMOVAL WITH HAND TOOLS

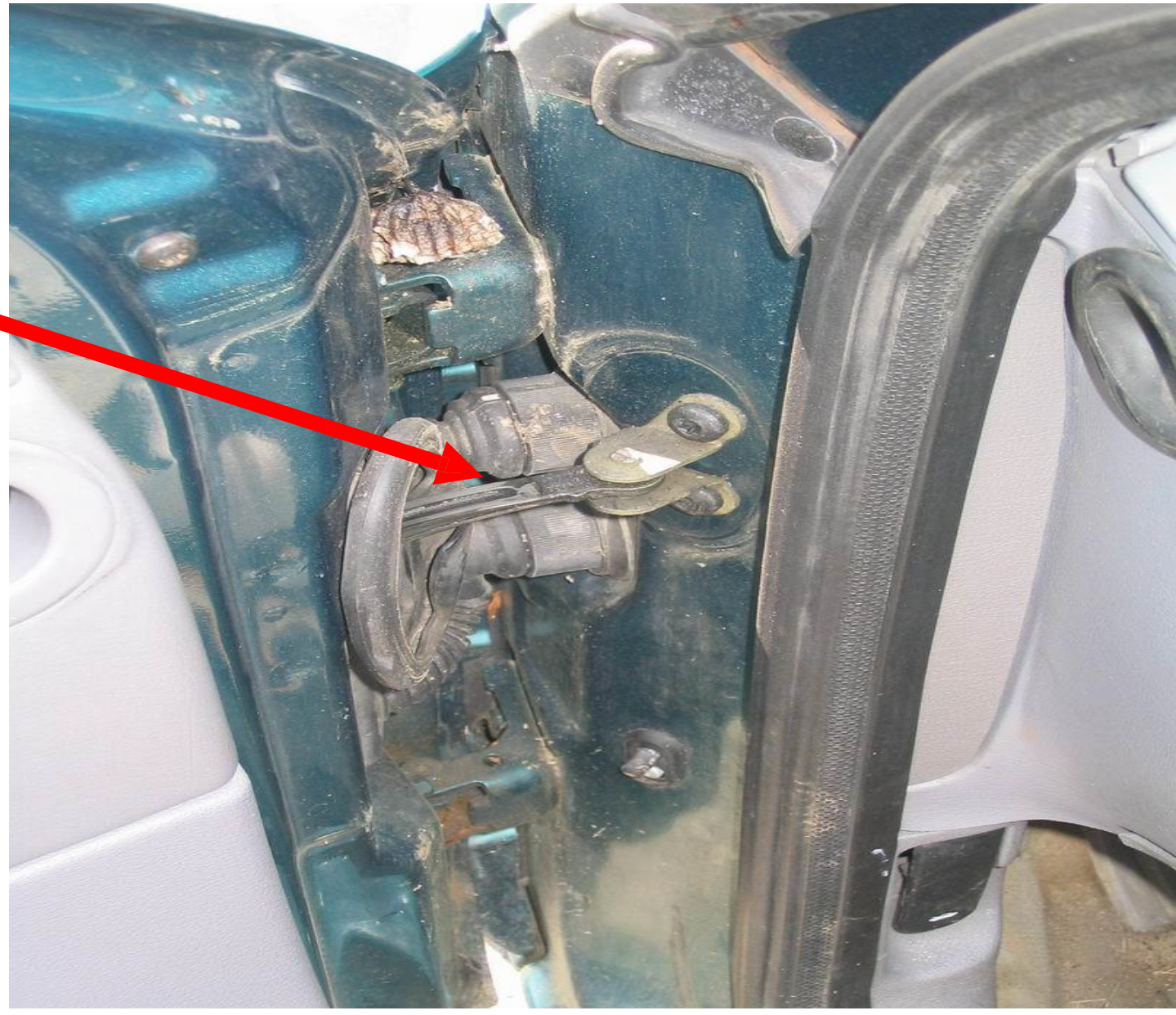
DOOR REMOVAL WITH HAND TOOLS





DOOR REMOVAL WITH HAND TOOLS

- The only thing that may hold you up is this little thing…

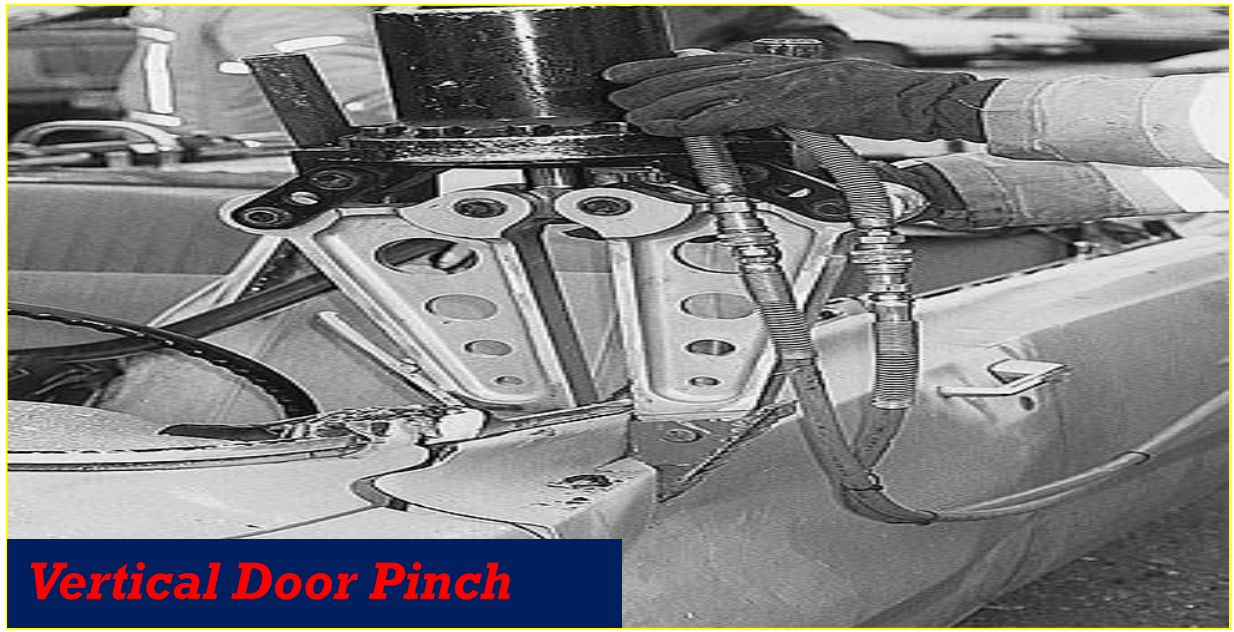


- Otherwise, you are in the car in 3 minutes.

ACCESS !!!

HINGE SIDE OR BOLT SIDE??

ATTACKING THE HINGES



ATTACKING THE BOLT SIDE

MAKING A 3RD DOOR

Make cut rearward at seat level

#1

Make vertical cut to wheel well

#2

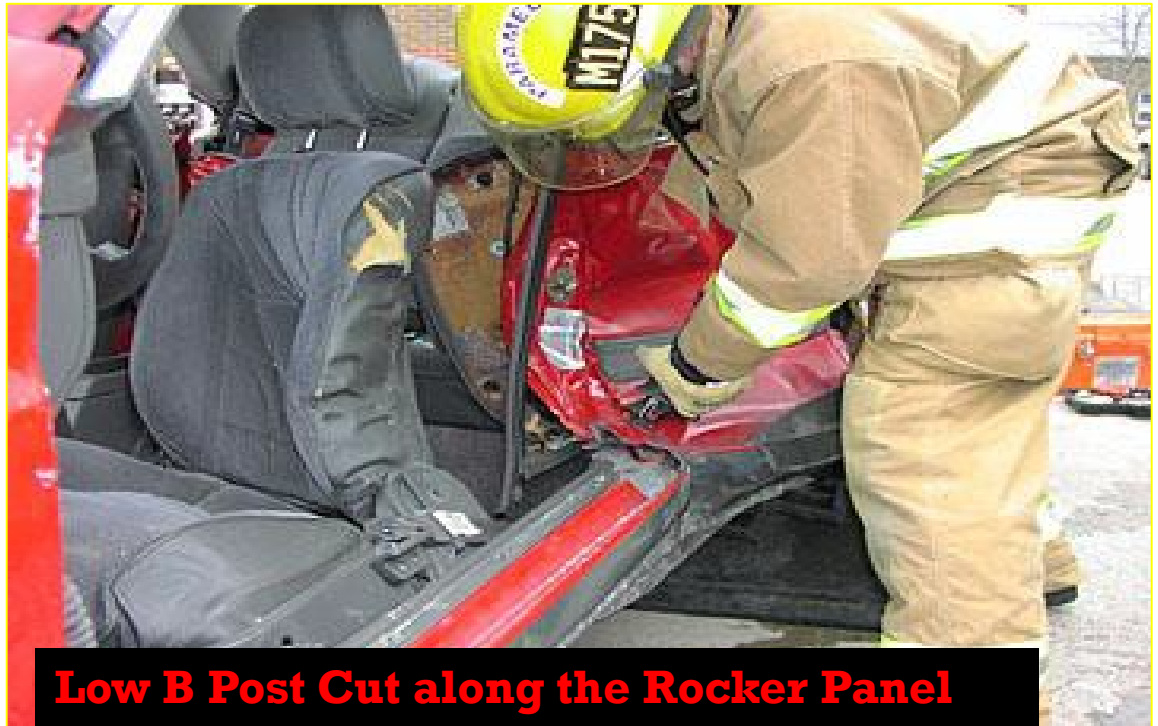
Clamp spreader down on the assembly

#3

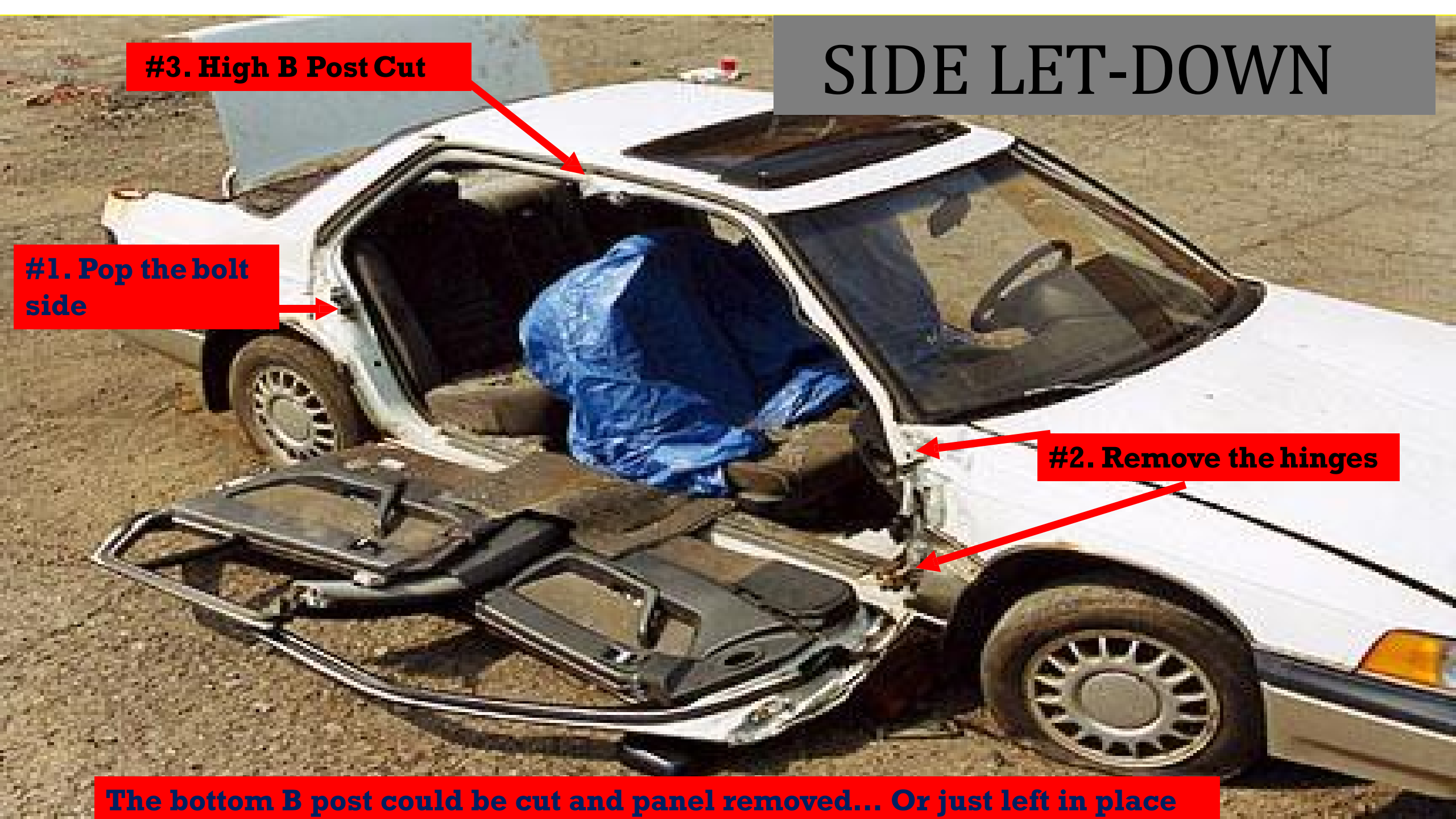
#4

MAKING A 3RD DOOR

OR

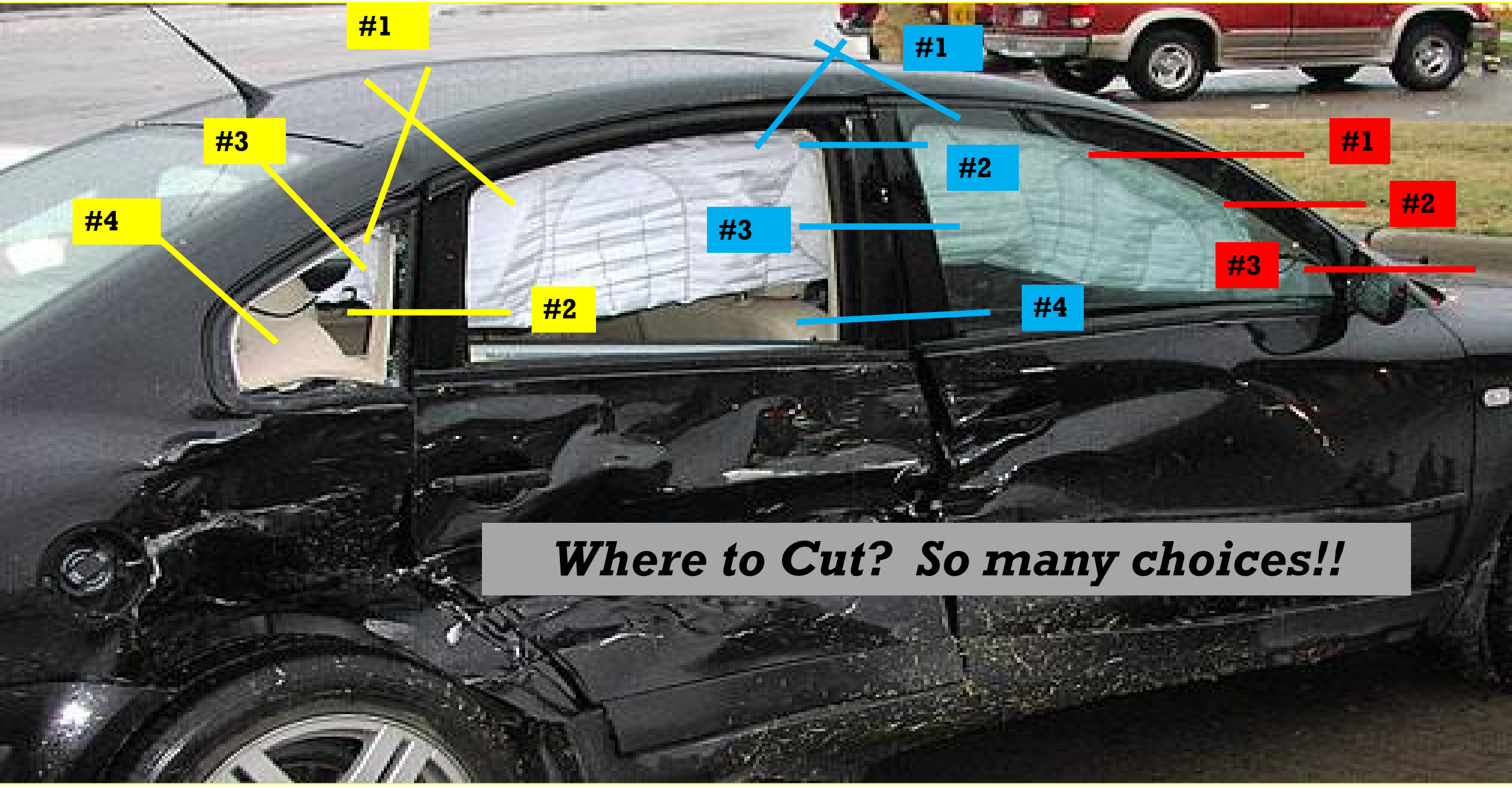


Side Removal


SIDE LET-DOWN
#3. High B Post Cut
#1. Pop the bolt side
#2. Remove the hinges
The bottom B post could be cut and panel removed… Or just left in place

Flap the roof down

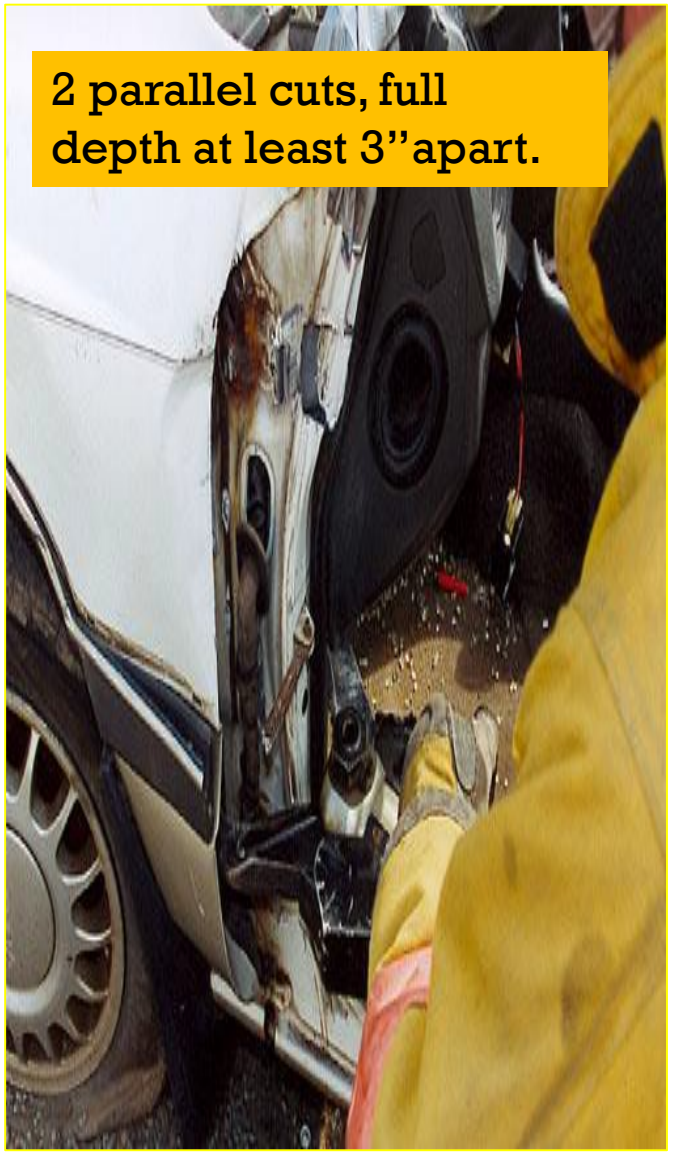
ROOF REMOVAL



DASH LIFT / DASH ROLL

Dang! More Choices?

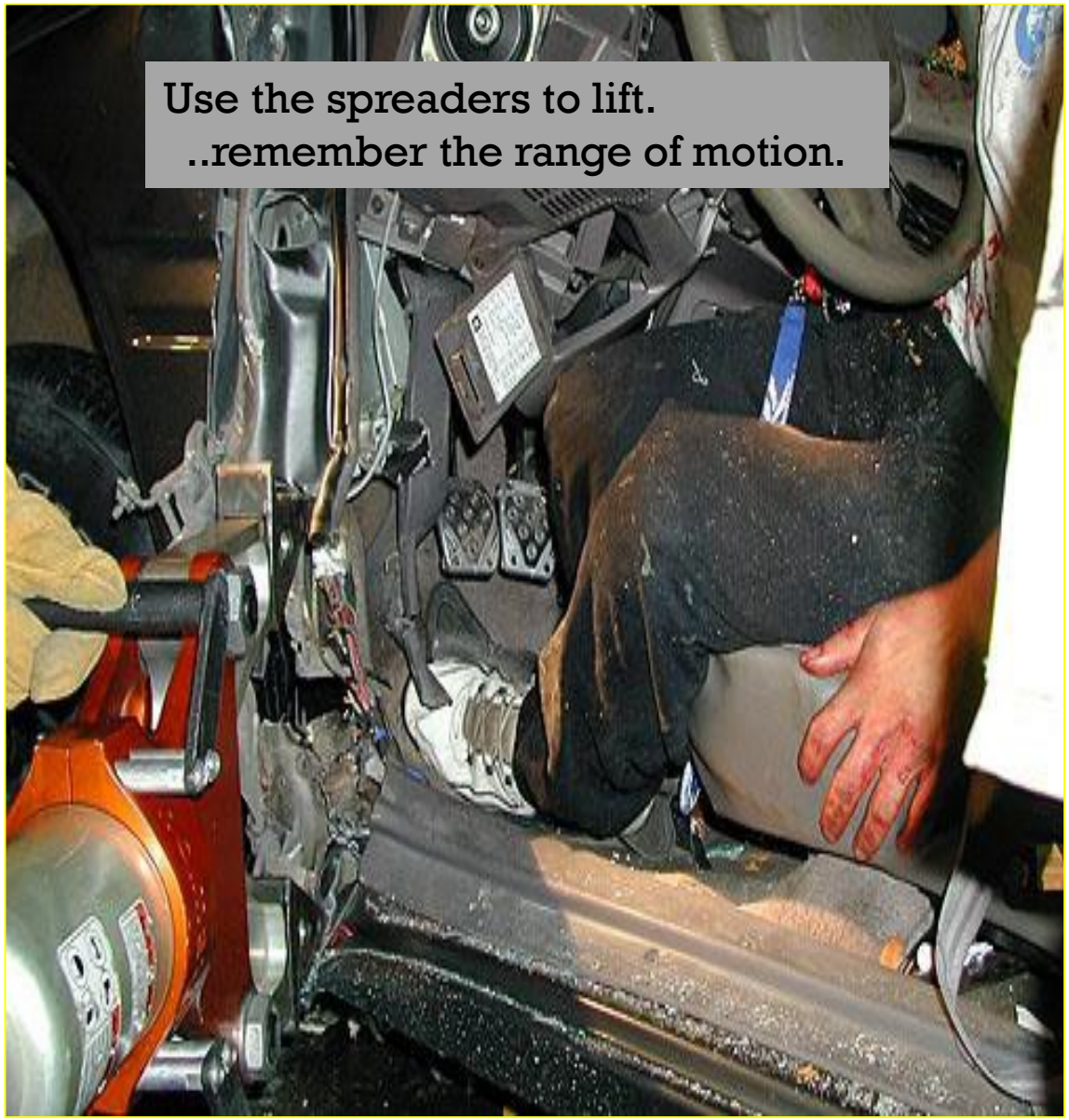
DASH LIFT


2 parallel cuts, full depth at least 3”apart.


Pinch spreaders between the 2 cuts


USE THE SPREADERS AS A HANDLE AND FOLD OUT THE PIECE

DASH LIFT


Use the spreaders to lift.
..remember the range of motion.

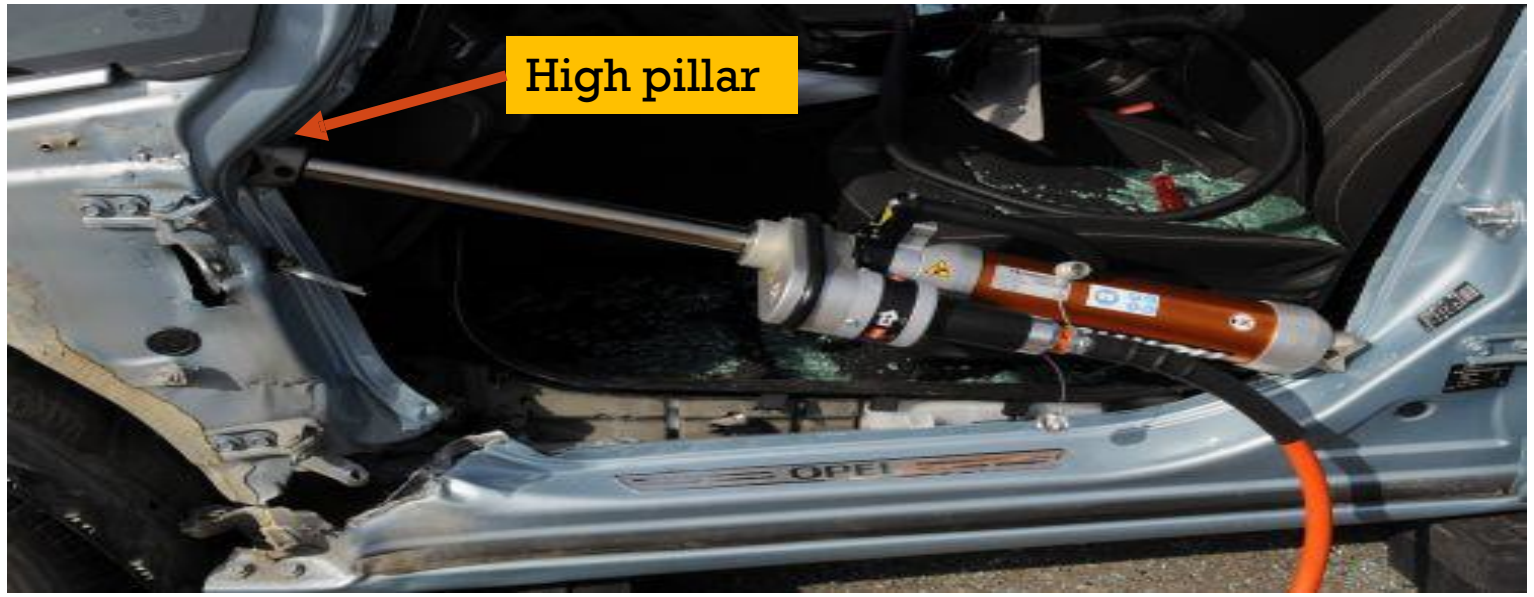

What if this doesn't work?

DASH ROLL

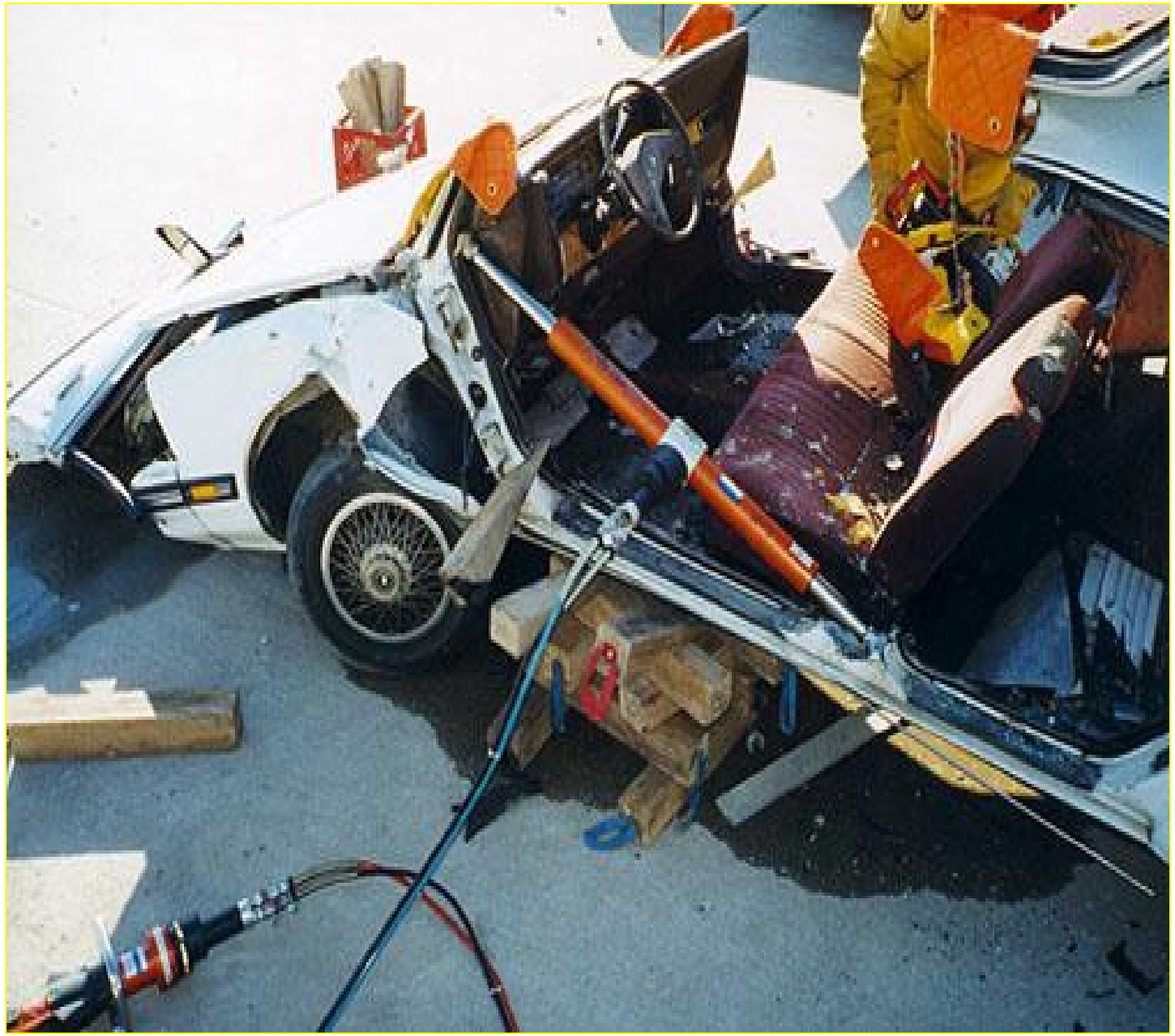

FENDER RELIEF CUT…. DO WE NEED IT?


Low A post
Rocker support plate


Pillar relief cut…. Do we need it?


High pillar

DASH ROLL



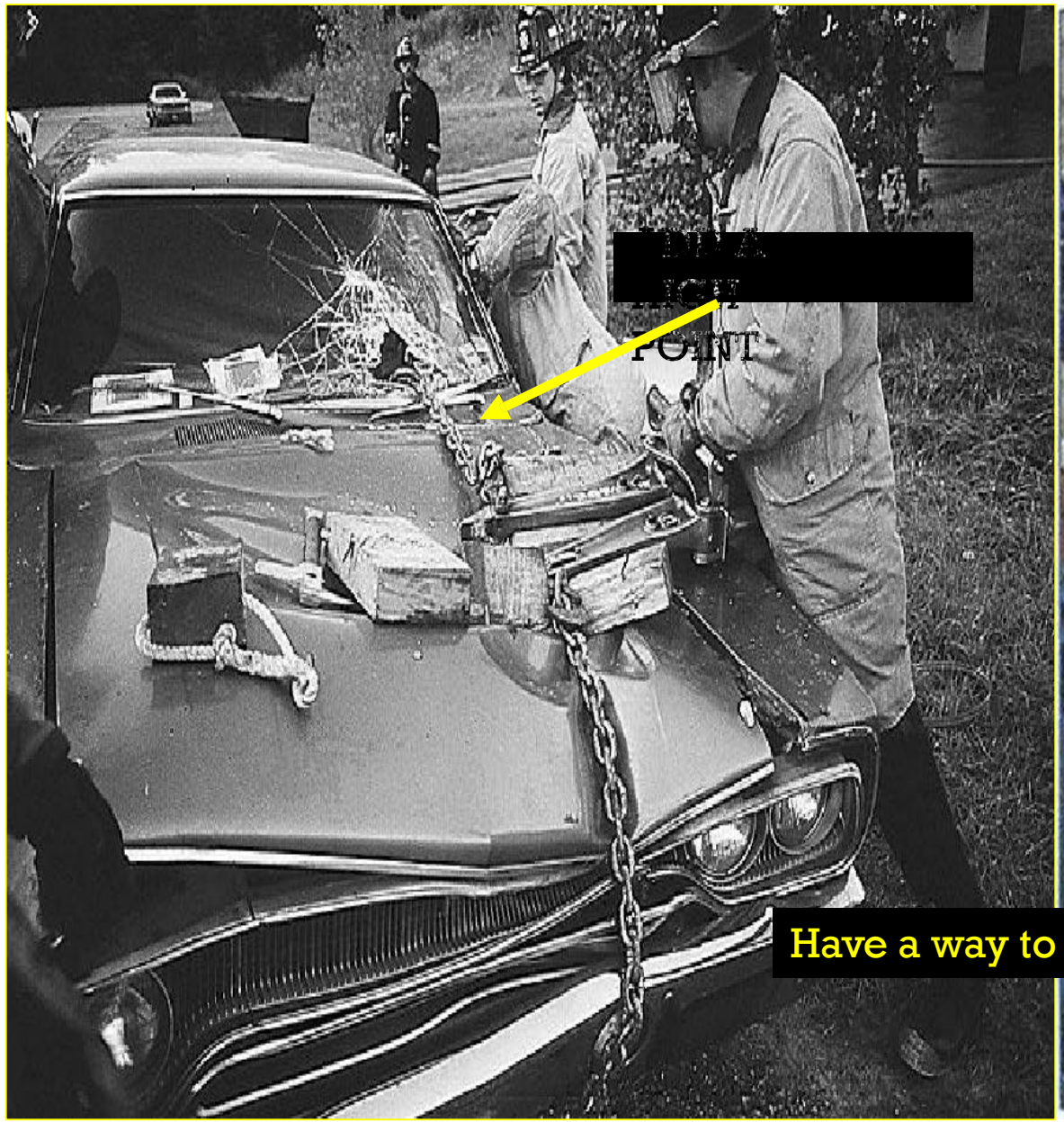
STEERING COLUMN LIFT

- Cut a circle in the windshield so rescuers can drop a chain to wrap around the steering column.
- Place a 4-inch x 4-inch (or 6x6) x 48-inch post on top of the windshield.

- Drop one end of the chain down the hole and wrap it around the column.
- Feed the loose end of the chain through the hole and onto the post; attach a hook.

- Insert the tips of a hydraulic spreader under the chain.
- Start to spread the arms of the tool apart and take up the slack in the chain.
- Operate the tool to force the chain to pull up the column and the steering wheel.

STEERING COLUMN LIFT



Have a way to capture your progress

CLAM SHELL


Load Attachment Points
High Point
Pulling Device
Anchor


Consider a Safety chain --also allows you to capture your raise
Cut both C posts. Relief cut both rockers.

CLAM SHELL

CLAM SHELL


Passenger seat, seat back is removed for better access.
Consider cutting the B post to drop the roof section to the ground

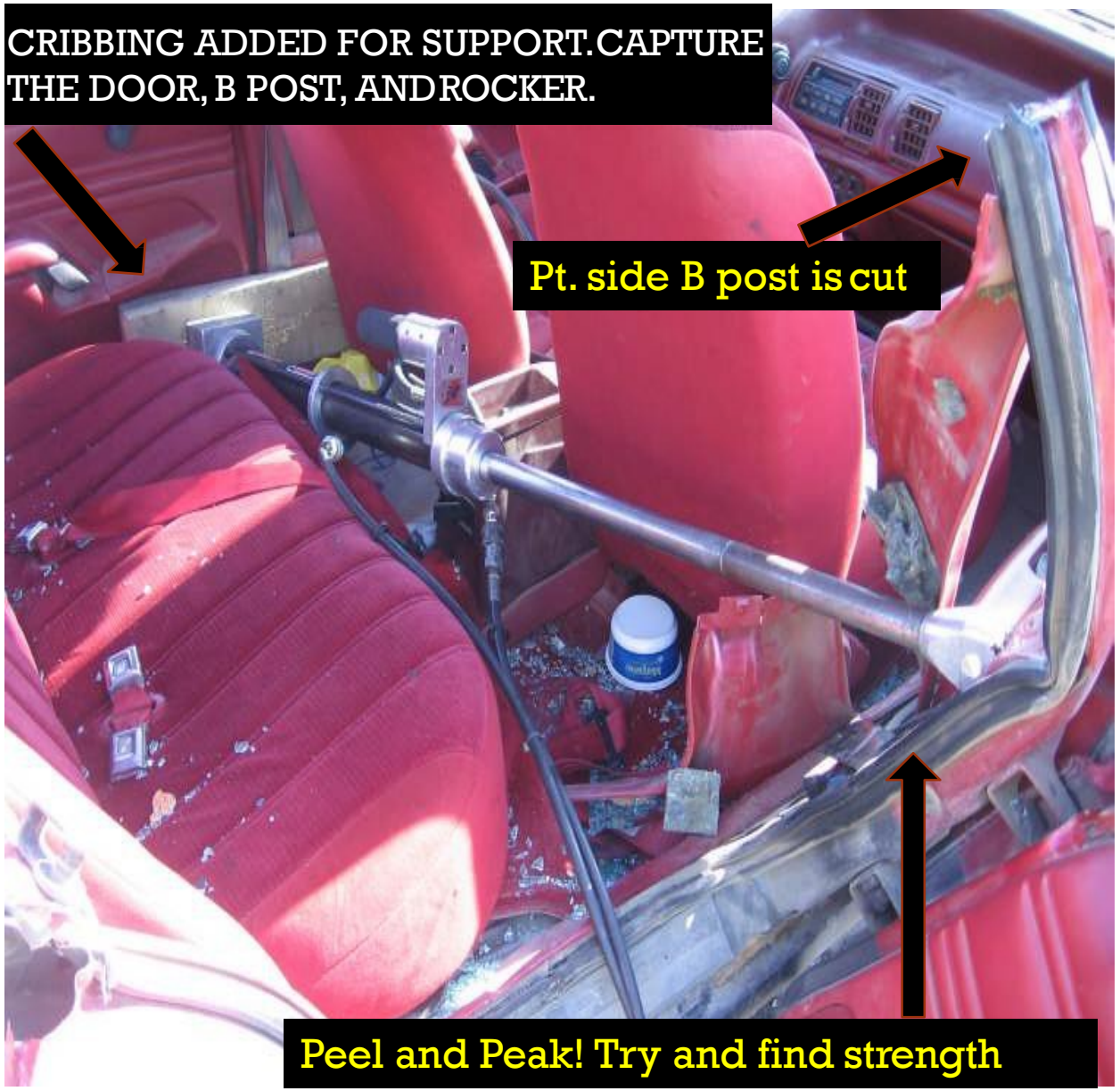
CROSS RAMMING

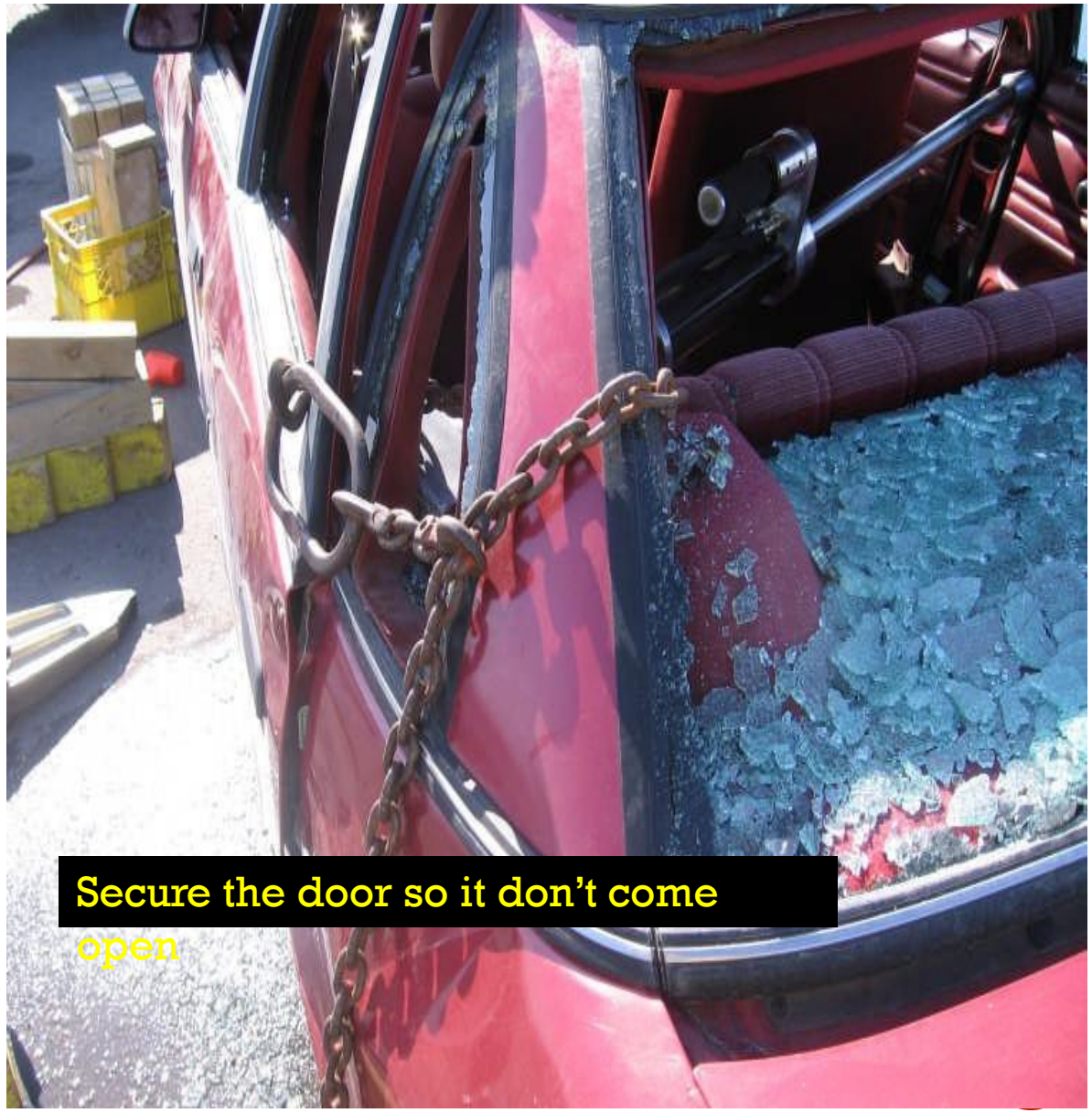
- Most latch or hinge side front/rear door attacks usually result in the b-pillar being pushed farther into the patient. This is due to the metal being weakened which causes the b-pillar to follow the path of least resistance moving inward toward the patient.

- Useful option on severely trapped occupants from a side impact intrusion where the patient is wedged between the B-pillar and the seat.

- Push the impacted side of the vehicle back out to it's near original position so the necessary requirements for patient removal can be done

CROSS RAMMING





CROSS RAMMING

If you leave the B Post intact, watch so the room doesn't drop on your pt.

Finish with a door or side removal.

CRITIQUING THE RESCUE

- Performing an after-action review is paramount for all crews that were on scene
- Critiques can be performed at the company level
- Critiquing yourself and your crew is the most important!
- Solicit feedback – What went wrong? What went right? Did this technique work for this situation?
- Document the critique of your own actions and your crews for reference at a later date

FLOORBOARD TUNNELING/REMOVAL

- Floorboard tunneling/removal is a seldom used tactic. It's typically only required when vehicle access is blocked on every side other than the bottom. When removing areas of the floorboard, the unexposed bracing often creates problems with air chisels and reciprocating saws.
- It may be especially useful when the victim is still seat-belted in an upside-down position—a situation that requires plenty of access for a successful extrication. If the victim's side is blocked, then the results of the tactic have even more impact. Further, center dash displacements can be completed much easier—and ergonomically. Finally, the tactic allows for a more systematic removal of part of the floor pan, the front seat, two doors and the bravo post, simultaneously.

TRUNK TUNNELING

- If plan A does work to remove patient…. Time for Plan B
- Trunk Tunneling was usually reserved for “tractor trailer under-ride” situations where there is no access from the sides of the vehicle, or you have no option to remove the roof. But due to the construction of today’s vehicles, we may consider tunneling as Plan B based on patient condition
- One of the weakest areas is the “rear trunk deck” or “rear bulkhead.” This thin sheet metal structure that separates the passenger compartment from the trunk area has been virtually unchanged for many years. We can use this weak point to our advantage and make short work of what would normally take longer to accomplish had we chosen the typical roof removal method.

https://youtu.be/cjeDwn75bbs

AT THE END OF THE DAY…..

- Understand that vehicle extrication is a systematic process.
- Have a plan…. Keep an open mind…. Always know your objective of your every tactic.
- Know your plan B or C….. Before your need them.
- There is no one correct way, just many incorrect ways.
- Every action has numerous reactions.

REFERENCES

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