STATIC LOAD
The load resulting from a constant applied force or mass. The load's actual weight or mass.

GVW
Gross Vehicle Weight. What the vehicle actually weighs. The vehicle's static weight when vertically lifted.

GVWR
Gross Vehicle Weight Rating. What the vehicle can support, i.e. The manufacturer says all designed components can withstand this amount of weight in total. (GVW plus load/cargo).

GAW
Gross Axle Weight. What an individual axle weighs. The static or total weight of an individual axle.

GCW
Gross Combination Weight. The total weight of towing vehicle and the towed vehicle, as if both vehicles were put on a scale at the same time. The total weight of all axles on the ground.

GCWR
Gross Combination Weight Rating. The maximum allowable weight of towing vehicle and the towed vehicle, as if both vehicles were put on a scale at the same time. The total or combined weight of towing vehicle and towed vehicle, as authorized by the manufacturer for its designed components to support.

TOW
Pulling a vehicle behind a power unit, with one or more sets of the towed vehicle's wheels touching the surface of the roadway.

TOW CAPACITY
The maximum amount of weight a towing vehicle can pick up or lift and tow on a wheel-lift or tow sling and still maintain 50% or 1/2 of it's original static weight on the front axle for adequate steering, handling, and braking, under ideal driving conditions **(1/2 F.A.W. Multiplied by the W.B. and Divided by O.H.)**

TRANSPORT
Load being secured and carried on the deck of a carrier or trailer.

ANCHOR-ABILITY
The primary way to anchor a road vehicle is to apply all of its brakes. To calculate what a vehicle or anchor needs to weigh to effectively anchor a given load, take the casualty's resistance and multiply by 1.5 or 1 1/2 times the amount of the resistance.

ULTIMATE LOAD (UL)
The average load or force at which the product fails or no longer supports the load. (To find Ultimate Load of any rigging component, MULTIPLY the Working Load Limit by the Design Factor.)

WORKING LOAD LIMIT (WLL)
The maximum mass or force which the product is authorized to support in general service when the pull is applied in-line; unless noted otherwise, with respect to the center-line of the product. This term is used interchangeably with the following terms: (1) WLL (2) Rated Load Value (3) Resultant Working Load. (To find the Working Load Limit, Divide the Ultimate Load by the Design Factor.)

DESIGN FACTOR
An industry term denoting a product's theoretical reserve capability. (To find the Design Factor, divide the Ultimate Load by the Working Load Limit.)

FMCSR - Federal Motor Carrier Safety Regulations.

MUTCD - Manual on Uniform Traffic Control Devices.

USDOT - United States Department of Transportation.

OSHA - Occupational Safety and Healthy Administration.

FHWA - Federal Highway Administration.

CMV - Commercial Motor Vehicle.

2/3 FUNDAMENTALS
CLASS OUTLINE

INTRODUCTION

SETTING THE STANDARD

- Safety & PPE
- Circle Check
- Traffic Lane Closure
- S.C.E.N.E.

RESISTANCE AND CAPACITY

- Weights
- Surface Resistance
- Resistance Flow Chart
- Resistance Problems
- Procedure for Success
- Anchor-Ability Problem

WINCHING AND SECURING

- Roll-Over Stiff Leg
- One Lane Parallel Up-righting
- Cruse Loop Technique
- Winching with the Cruse Loop
- Continuous Loop Recovery Straps
- Loading and Securing
- Homework Problem
- Review

INTRO TO TOWING

- Tow Capacity
- Weight Transfer

RIGGING

- Secondary Attachment Chains
- Rigging-Wire Rope
- Rigging-Synthetic Winch Line
- Rigging-Wire Rope
- Rigging-Chain
- Hooks & Placement
- Design Factor & Ratings
- One Lane Parallel Up-righting
- Attachments & Securements

THE WRECKMASTER PLEDGE

A Little History...

The towing and recovery industry came to existence shortly after the invention of the automobile. It seemed that these new marvels were not perfect and were prone to breakdowns and driver error, resulting in accidents of all kinds. At first, towing was quite simple, you merely hooked onto a reasonably secure part of the vehicle to be towed or pulled. If the vehicle needed to be recovered from a ditch or a rolled-over position, it was basically a trial and error process, hooking to whatever seemed reasonable and attempting to recover or up-right the casualty.

Somehow, this picture does not suit the typical cars and chemical tanker of today. The industry has been progressing steadily. Demand for both of these times has been growing tremendously, especially over the last few years.
Computer needs have been fulfilled' for he most part, by those specializing in that component of today's technology. Specialized training requirements, however, have been fulfilled only in part due to the limited number of such programs available today. For this reason, WreckMaster was introduced.



> "The industry has been progressing steadily over the last decade to include specialized training for our drivers."

About WreckMaster

WreckMaster is an educational program which uses current university type systems as a model. Students will register for each hands-on leveled class (scheduled at different times for most convenience). Upon completion of each course, students will be credited with the courses taken; provided of course, the certification cards identifying their level of qualification, which are determined by the courses listed as "passed" on their WreckMaster transcripts.

"This program will satisfy the gap that currently exists, leading to certification of tow truck operators."

This program will satisfy the gap that currently exists, by providing a detailed scheduled and recognized set of training courses, ultimately leading to certification of tow truck operators and other personnel involved in your business.

SAFETY & PPE

WreckMaster recommends the following items as minimum personal protection equipment (PPE) prior to a work shift:

SAFETY & MINIMUM PPE EQUIPMENT

SAFETY VEST
SAFETY-TOED BOOTS
WORK GLOVES
SAFETY HELMET / HARD HAT
PROTECTIVE EYEWEAR

ADDITIONAL ITEMS

CELL PHONE
TWO PENS
TIME PIECE
COMPANY CREDIT CARD
CALCULATOR
ASSOCIATION CREST
BUSINESS CARDS
DRIVERS LICENSE
POCKET KNIFE / MULTI-TOOL



INCLUDE A GO-BAG

EXTRA UNIFORM / SPARE SHIRT
EXTRA SOCKS
EXTRA PAIR OF WORK GLOVES
SEASONAL CLOTHING
(RAIN & SNOW SUITABLE WEAR)
PENS
PAPERWORK
FIRST AID
PRESCRIPTIONS
(MEDICATION & GLASSES)
SPARE PHONE CHARGER

A Professional Appearance & Attitude are Key

Readying your appearance for the day must go further than equipping your company's uniform and remembering your safety equipment - uniforms should be cleaned regularly, and equipment inspected to ensure it is suitable for use to keep you safe.

CIRCLE CHECK

WreckMaster Circle Check and/ or Daily Vehicle Inspections are referred to as Pre-Trip & Post-Trip Inspections. Remember, a CLEAN TRUCK is an EFFICIENT TRUCK. Operating a clean truck is necessary to conduct a thorough safety inspection.

ENGINE
OIL
WINDSHIELD WASHER FLUID
BATTERY LIFE
RADIATOR AND COOLANT
TRANSMISSION FLUIDS
FUEL LEVEL

TOWING EQUIPMENT
BOOM
WINCH LINE AND HOOKS
WINCH
WRECKER CONTROLS
WIRE ROPE
DOLLIES
LIFT CYLINDER
WRECKER MAST
SECONDARY ATTATCHEMENT POINTS



BODY & WHEELS
WHEELS (RIMS, LUG NUTS)
BRAKE LIGHTS / SIGNALS
EMERGENCY LIGHTS
WINDSHEILD WIPERS
PARKING BRAKE
DOORS
EXHAUST
MUD FLAPS
MIRRORS
HORN
SEAT BELTS
SUSPENSION
WINDOWS
FUEL TANKS
TIRES

STOWED ITEMS
WRECKMASTER SKATES
BROOMS OR SHOVELS
FIRE EXTINGUISHER
CONES / PYLONS
FIRST AID KIT
CHAINS
STRAPS
HOOKS



REMEMBER

A **DAILY VEHICLE INSPECTION** should be performed **EVERY DAY** the vehicle is in use.

A TRAFFIC CONTROL PLAN SHOULD INCLUDE THE FOLLOWING:

- Advanced warning for drivers of road work ahead.
- Traffic control devices to clearly mark the work zone and channel traffic through it.
- Returning traffic to normal patterns as quickly, safely and efficiently as possible.

A TRAFFIC CONTROL PLAN NEEDS TO ADDRESS THESE FACTORS:

- Type of roadway (number of lanes, divided or undivided highway, ect.)
- Volume and speed of traffic (number and speed of cars & trucks, ect.)
- Type of job & how long it will last. Traffic Control Incident (Three primary classifications)
  - Major - 2 hours or more.
  - Intermediate - 30 minutes up to 2 hours.
  - Minor - 30 minutes or less.

ADVANCED WARNING SIGNS:

Advanced signage should be positioned in such a manner that gives motorists sufficient time to react to the conditions and incident ahead.

- Emergency traffic control warning & guide signs should have:
  - Diamond shape
  - Black lettering & a black border
  - Fluorescent background
- The signs come in two sizes:
  - 36” x36” - Low speed, low volume
  - 48” x 48” - High speed, high volume



MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD)

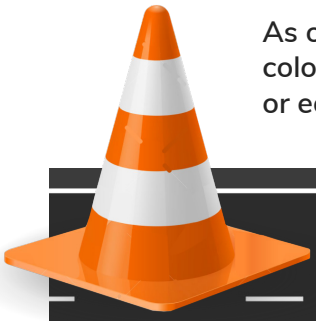
- Federal guideline for all traffic control nationwide.
- It also covers all “workers” on all streets, roadways, or highways
- This addresses what is required to adhere to MUTCD standards

MUTCD Recommendation Sign Spacing for Advanced Warning Signs:

TYPE OF ROADWAY	SPEED	SIGN A	SIGN B	SIGN C
Urban, Slow Speed	40 mph or less	200 ft.	400 ft.	600 ft.
Urban, High Speed	45 mph or more	350 ft.	700 ft.	1,050 ft.
Rural (secondary)	45 mph or more	500 ft.	1,000 ft.	1,500 ft.
Expressway	45 mph or more	1,000 ft.	1,600 ft.	2,600 ft.

The Occupational Safety & Health Administration (OSHA) references and enforces standards and recommendations found in the Federal Highway Administration's (FHWA) Manual on Uniform Traffic Control Devices (MUTCD). See CFR 29, Part 1926.200-203.

SPEED (MPH)	Advanced Warning Sign Minimum Distance (ft)				Recommended Lengths (ft)					Cone Spacing
	A	B	C	Cumulative Total	Shoulder Taper	Taper	Distance Between Tapers	Buffer (longitudinal)	Down-stream Taper	
25	100	100	100	300	45	125	250	155	50-100	25
35	350	350	350	1,050	85	245	490	250		35
45	500	500	500	1,500	180	540	1,080	360		45
55	1,000	1,500	2,640	5,140	220	660	1,320	495		55
65	1,000	1,500	2,640	5,140	260	780	1,560	645		65



As outlined in the MUTCD Section 6F.64, cones shall be predominantly orange in color and 28" to 36" in height. Cones used at nighttime shall be retroreflectorized or equipped with light devices. See MUTCD Chapter 6F.59 for further details.



All towing companies dealing with traffic incidents should have a Temporary Traffic Control(TTC) plan.

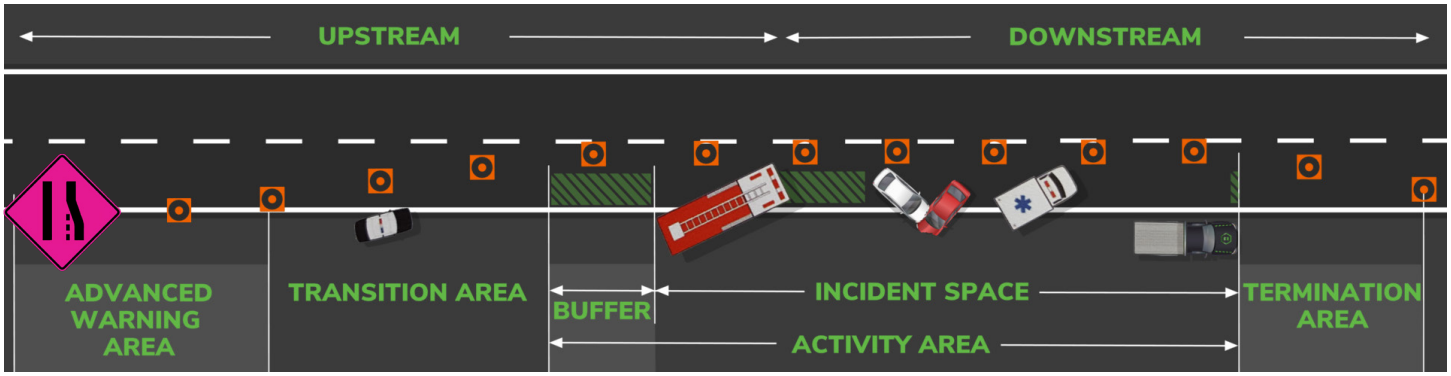
Effective TIM (Traffic Incident Management) reduces the duration and impacts of traffic incidents and improves the safety of motorists, crash victims, emergency and towing/ recovery responders.

UPSTREAM STAGING

- Law Enforcement
- Fire
- DOT or Safety Service
- Traffic Control Vehicles

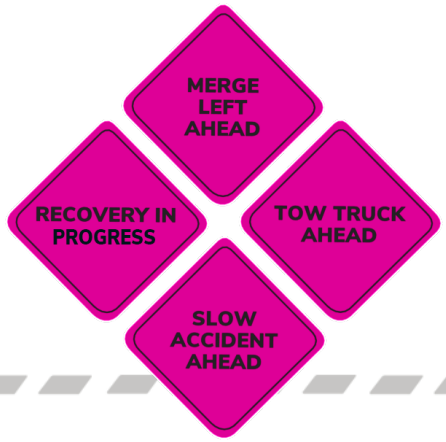
DOWNSTREAM STAGING

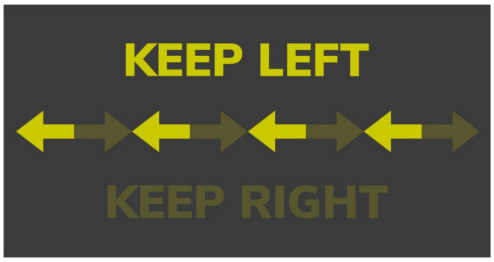
- Ambulance
- Tow & Recovery Equipment
- Other Support Units



TRAFFIC INCIDENT MANAGEMENT AREA

Advanced Warning Area Signs alert traffic of what to expect and what to do ahead.







SCENE

5 POINT GUIDE

SURVEY

When you arrive at the scene, park out of the way, identify yourself to the customer or officials and inform them you will SURVEY the casualty and the situation and report back to them.

CALCULATE

After gathering any and all information necessary, calculate the resistance to overcome to ensure that the rigging/equipment will withstand the forces applied and your plan of action will be successful.

EXPLAIN

Explain to the customer or to officials what you are planning to do and what you need from them to complete the mission.

NO's

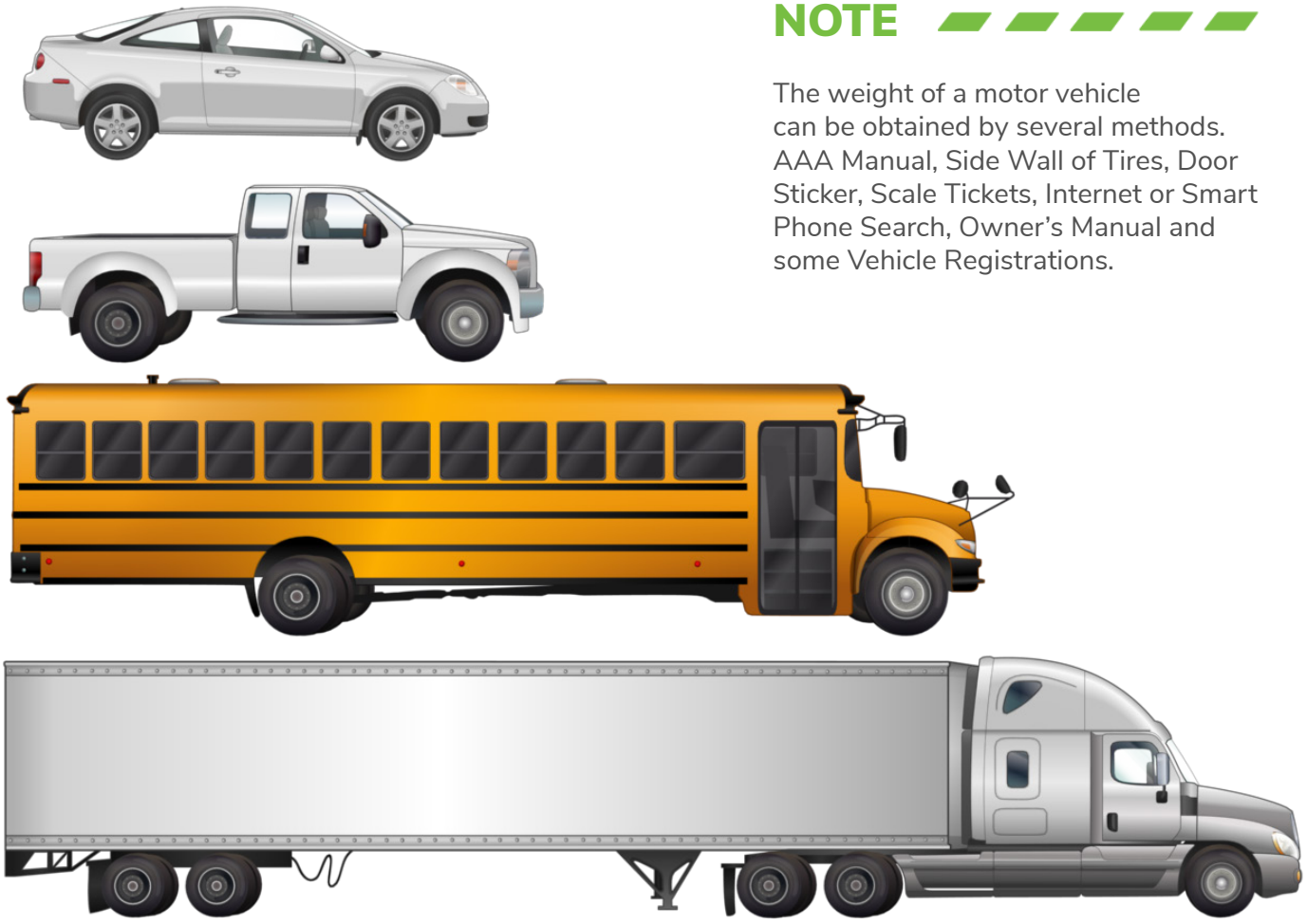
Ready your trucks for positioning, block the roadway only with permission, move into position, walk around and validate all rigging to ensure there are no errors that will embarrass you.

EXECUTE

Finalize and engage your plan for success.

DO IT ONCE, DO IT RIGHT.

HOW MUCH DOES IT WEIGH?



NOTE

The weight of a motor vehicle can be obtained by several methods. AAA Manual, Side Wall of Tires, Door Sticker, Scale Tickets, Internet or Smart Phone Search, Owner's Manual and some Vehicle Registrations.

ROLLING RESISTANCE

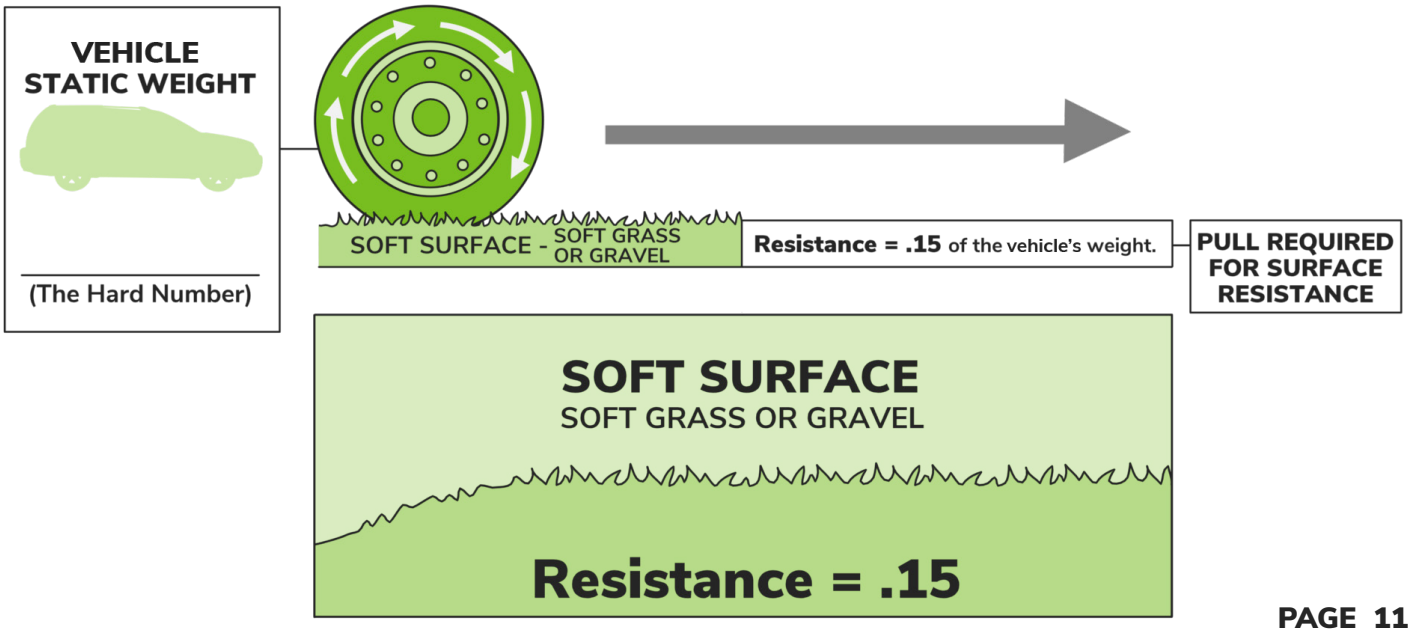
ROLLING HARD

The resistance which must be overcome to set a vehicle in motion. On hard flat and level surfaces, such as asphalt or hard grass or gravel, the resistance is generally estimated as up to 5% or **.05** of the vehicle's static weight.



ROLLING SOFT

On some soft or rough surfaces, such as grass or gravel, the resistance is generally estimated as up to 15% or **.15** of the vehicle's static weight.



DAMAGE RESISTANCE

When Rolling or Mire Resistance are not present and does not apply. When the tires and wheels on a vehicle will not turn or rotate (as when the brakes are locked), or the vehicle or load has no tires or wheels at all. This Resistance is generally estimated as up to **two-thirds (2/3)** or **.666** of the vehicle's weight.



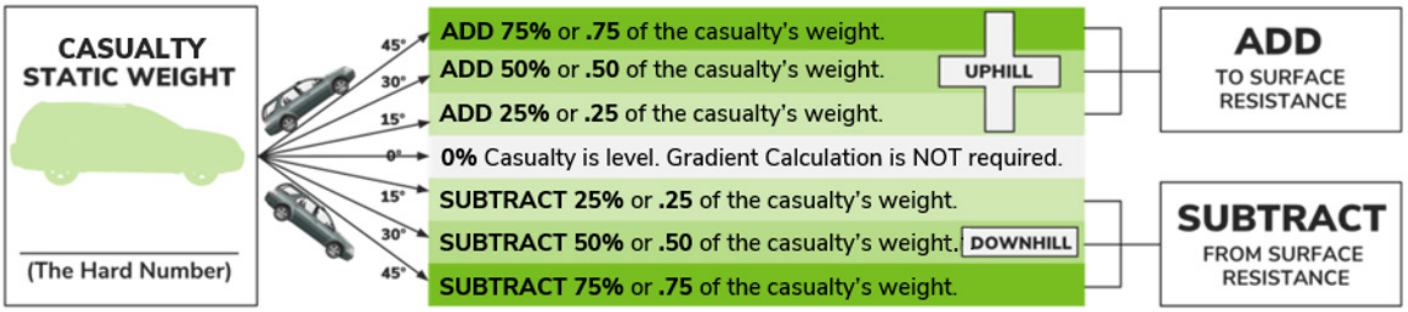




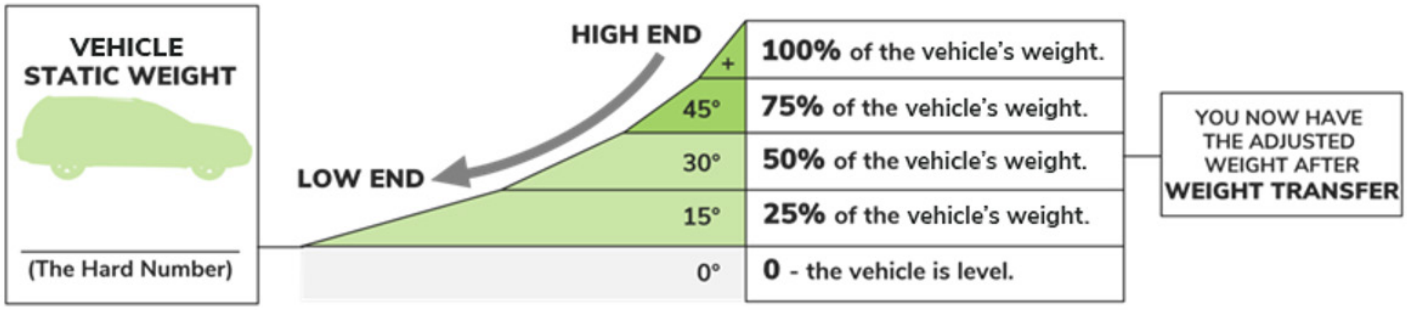
REMEMBER

The term **RESISTANCE** refers to: **THE PERCENTAGE OF WEIGHT THAT NEEDS TO BE MOVED.**

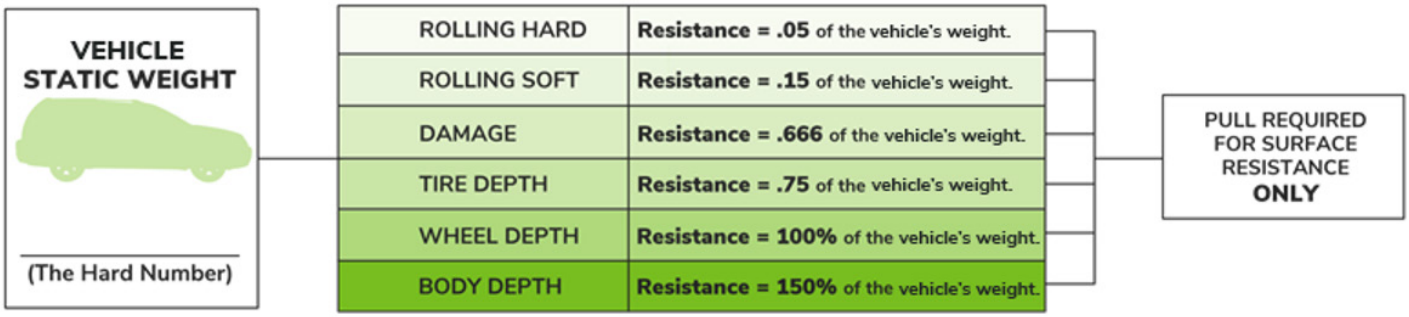
CALCULATING GRADIENT RESISTANCE



CALCULATING WEIGHT TRANSFER



CALCULATING SURFACE RESISTANCE



* For Anchor-Ability multiply the result by 1.5

RESISTANCE PROBLEM

Scenario & Facts:

A car weighing **2,900 lbs** requires service:

- Front axle weighs **1,500 lbs**
- Rear axle weighs **1,400 lbs**
- Both front tires are flat
- The rear axle has no damage and the tires and wheels will rotate freely
- The tie rod is bent
- The front tires are not going to rotate when the unit moves
- The car is on a hard packed gravel surface
- The driver is at the scene
- The car is almost new
- The only mechanical damage is the front axle.
- The conditions are; clear weather, 2 p.m., one police officer on the scene and the traffic is normal

What is the surface resistance to be overcome if a winching method is employed?

2,900 lbs



CALCULATE THE RESISTANCE

CASUALTY SPECIFICATIONS

STATIC WEIGHT: 2,900 lbs
FRONT AXLE: 1,500 lbs
REAR AXLE: 1,400 lbs



HARD PACKED GRAVEL SURFACE

Weight of Vehicle _____ lbs
Type of resistance _____
Level of resistance _____
Resistance factor (rate) _____
Surface Resistance _____ lbs

Weight of Vehicle _____ lbs
Type of resistance _____
Level of resistance _____
Resistance factor (rate) _____
Surface Resistance _____ lbs

Total Surface Resistance
_____ lbs

TOTAL RESISTANCE TO BE MOVED

Winching Source Static Weight
_____ lbs

FOR ANCHOR-ABILITY

REISTANCE PROBLEM

Scenario & Facts:

A Single Axle Truck weighing **29,000 lbs** requires service:

- Front axle weighs **12,000 lbs**
- Rear axle weighs **17,000 lbs**
- Both front tires are flat
- The rear axle has no damage and the tires and wheels will rotate freely
- The tie rod is bent
- The front tires are not going to rotate when the unit moves
- The truck is on a hard packed gravel surface
- The driver is at the scene
- The truck is almost new
- The only mechanical damage is the front axle
- The conditions are; clear weather, 2 p.m., one police officer on the scene and the traffic is normal

What is the surface resistance to be overcome if a winching method is employed?



CALCUATE THE RESISTANCE

CASUALTY SPECIFICATIONS

STATIC WEIGHT: 29,000 lbs
FRONT AXLE: 12,000 lbs
REAR AXLE: 17,000 lbs



HARD PACKED GRAVEL SURFACE

Weight of Vehicle _____ lbs
Type of resistance _____
Level of resistance _____
Resistance factor (rate) _____
Surface Resistance _____ lbs

Weight of Vehicle _____ lbs
Type of resistance _____
Level of resistance _____
Resistance factor (rate) _____
Surface Resistance _____ lbs

Total Surface Resistance
_____ lbs

TOTAL RESISTANCE TO BE MOVED

Winching Source Static Weight
_____ lbs

FOR ANCHOR-ABILITY

CALCUATE THE RESISTANCE

CASUALTY SPECIFICATIONS

STATIC WEIGHT: 10,100 lbs
FRONT AXLE: 4,600 lbs
REAR AXLE: 5,500 lbs



HARD PACKED GRAVEL SURFACE

Weight of Vehicle _____ lbs
Type of resistance _____
Level of resistance _____
Resistance factor (rate) _____
Surface Resistance _____ lbs

Weight of Vehicle _____ lbs
Type of resistance _____
Level of resistance _____
Resistance factor (rate) _____
Surface Resistance _____ lbs

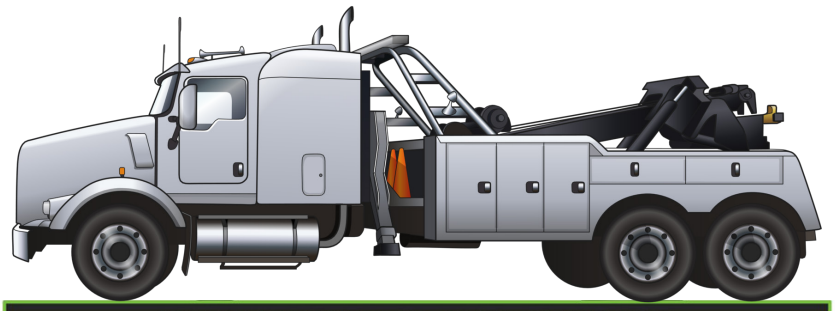
Total Surface Resistance
_____ lbs

TOTAL RESISTANCE TO BE MOVED

CALCUATE THE RESISTANCE

CASUALTY SPECIFICATIONS

STATIC WEIGHT: 40,000 lbs
FRONT AXLE: 14,000 lbs
REAR AXLE: 13,000 lbs each



HARD PACKED GRAVEL SURFACE

Weight of Vehicle _____ lbs
Type of resistance _____
Level of resistance _____
Resistance factor (rate) _____
Surface Resistance _____ lbs

Weight of Vehicle _____ lbs
Type of resistance _____
Level of resistance _____
Resistance factor (rate) _____
Surface Resistance _____ lbs

Total Surface Resistance
_____ lbs

TOTAL RESISTANCE TO BE MOVED

BEFORE ENGAGING THE WINCH YOU MUST FIRST ESTABLISH:

1. **IDENTIFY** the **HARD NUMBER** or **STATIC WEIGHT** of the casualty or load.

2. **IDENTIFY** the **TYPE** of **RESISTANCE** being created.
CAUTION: the type of resistance may have multiple levels.

3. **IDENTIFY** the **WEIGHT** for **EACH TYPE** of **RESISTANCE** being created.
(If more than one type or level of resistance is present.)

4. **IDENTIFY** the **RESISTANCE FACTOR** for **EACH TYPE** of **RESISTANCE.**

5. **CALCULATE** the **RESISTANCE TO OVERCOME.**

ROLL-OVER STIFF LEG

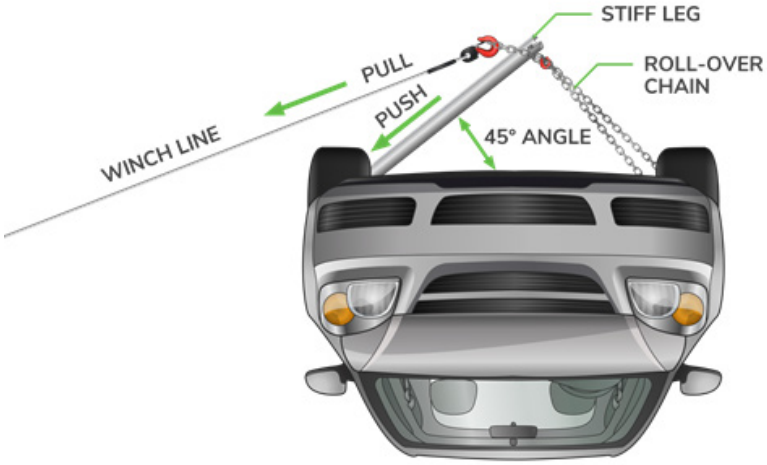
The roll-over stiff leg is an excellent device for up-righting an overturned vehicle, because the compression load on the stiff leg will force the vehicle to turn on its axis. Once the vehicle is on its side, the stiff leg will fall out as you continue to upright.

NOTE

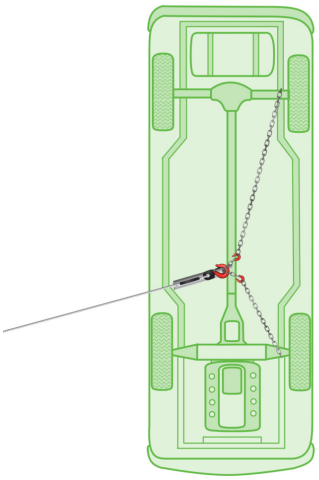
Today, many operators now use PVC, Schedule 80 plastic pipe, instead of using the heavier hard wood 4”x 4”.



Cut in the appropriate manner, a stiff leg can be made quite easily out of a 3 1/2 foot (42”) length of 2 1/2”, Schedule 80 PVC plastic pipe, as illustrated above. Pay special attention to the detail of the notching, as this is the critical part of the design. The use of the roll-over stiff leg is outlined below.



TOP VIEW



Check out WreckMaster’s Tutorials online at wreckmaster.com for videos and course-ware demonstrating this procedure.

ROLL-OVER STIFF LEG

The illustration below is a side view of the one-lane parallel up-righting on a passenger car. The low pull, when used with the roll-over stiff leg, is extremely beneficial when up-righting a vehicle on any slippery surface, such as snow or ice.

The angle of the stiff leg, coupled with the compression load the leg places on the casualty, forces the vehicle to rotate without sliding.

This is the traditional design and cut used for a roll-over stiff leg made of Schedule 80 PVC pipe. For many years since its introduction, it has been outstanding and an all around success, being an extremely versatile and useful tool in towing, transport and recovery industry.



Front View



Side View

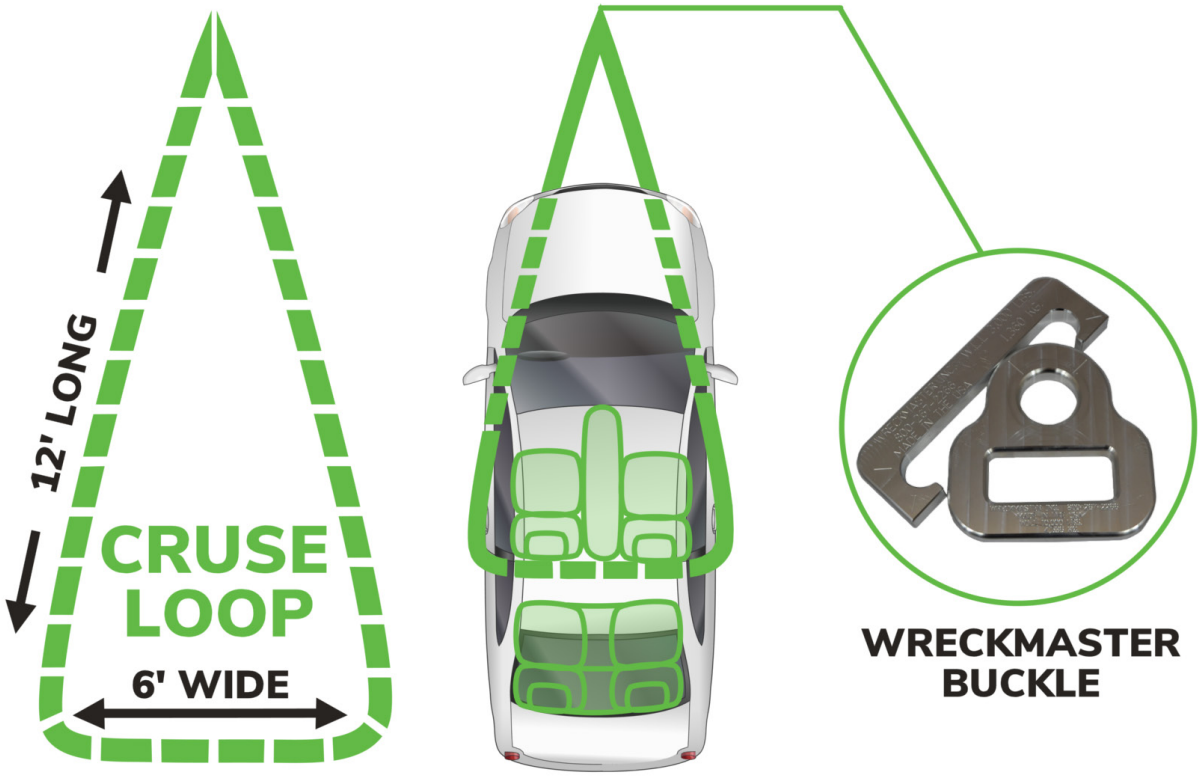


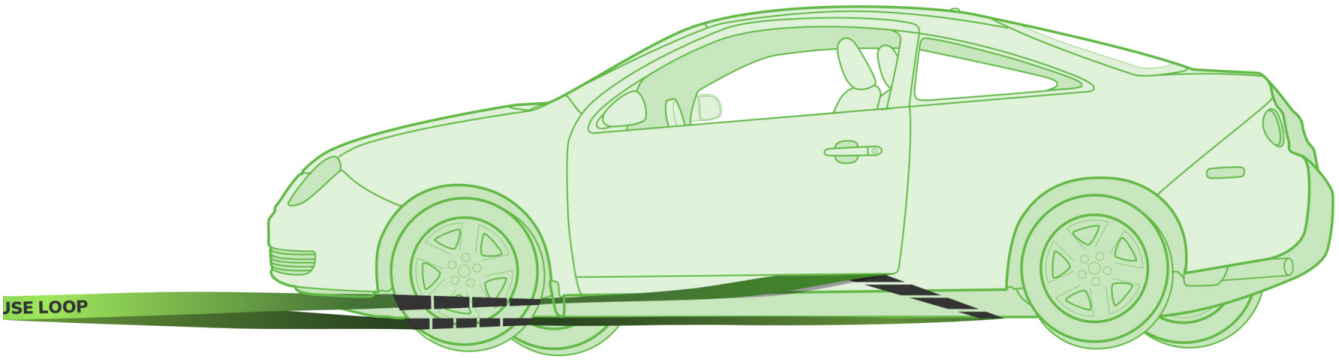
A short piece of chain, minimum 1/4” grade 8 alloy, approximately 15” to 18” in length, with grab hooks at each end is referred to by WreckMaster as a Sister Chain. This piece of riggin is needed in the stiff leg up-righting procedure.

You will be sure to find the roll-over stiff leg is a great asset in the up-righting of passenger cars and it has many other uses for recoveries as well.

CRUSE LOOP TECHNIQUE

The term CRUSE LOOP Technique refers to a method for recovering uni-body passenger cars. The CRUSE LOOP is a 4” wide by 30’ long recovery strap.





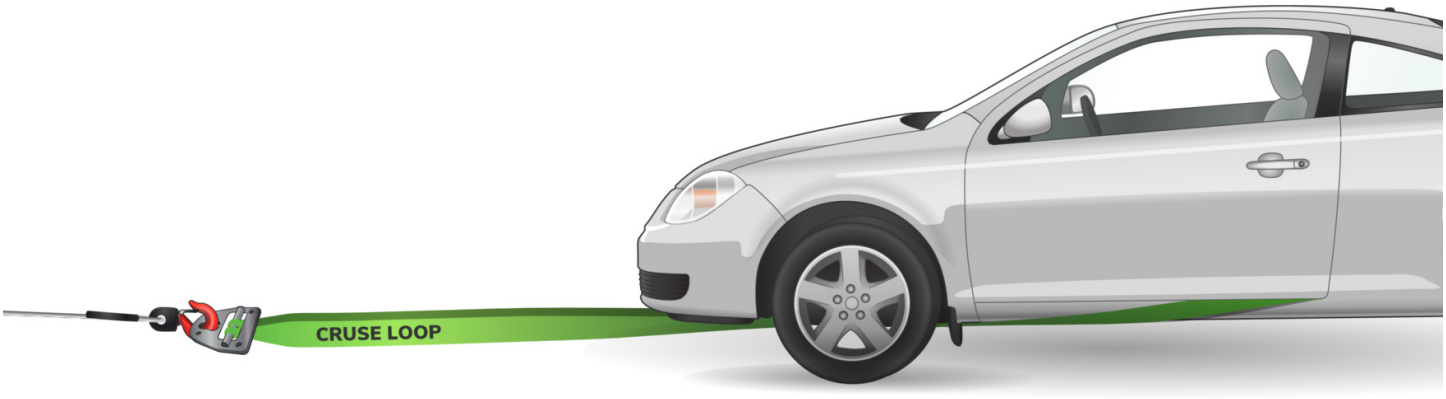


TIP

VEER ANGLE RATIO - LENGTH TWICE the **WIDTH** (ratio of 2 to 1)

WINCHING WITH THE CRUSE LOOP

The term CRUSE LOOP Technique refers to a method for recovering uni-body passenger cars. The CRUSE LOOP is a 4” wide by 30’ long recovery strap.

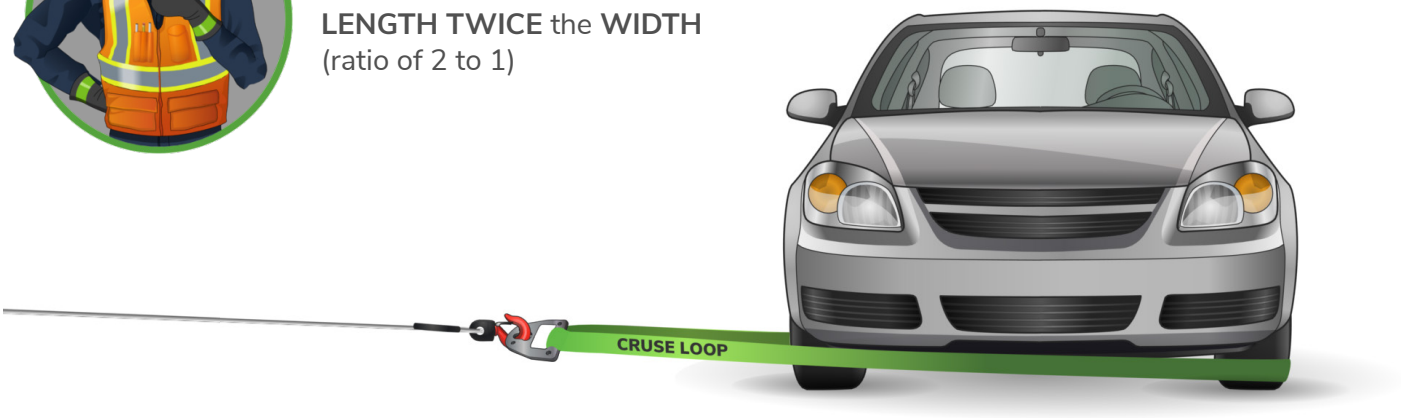






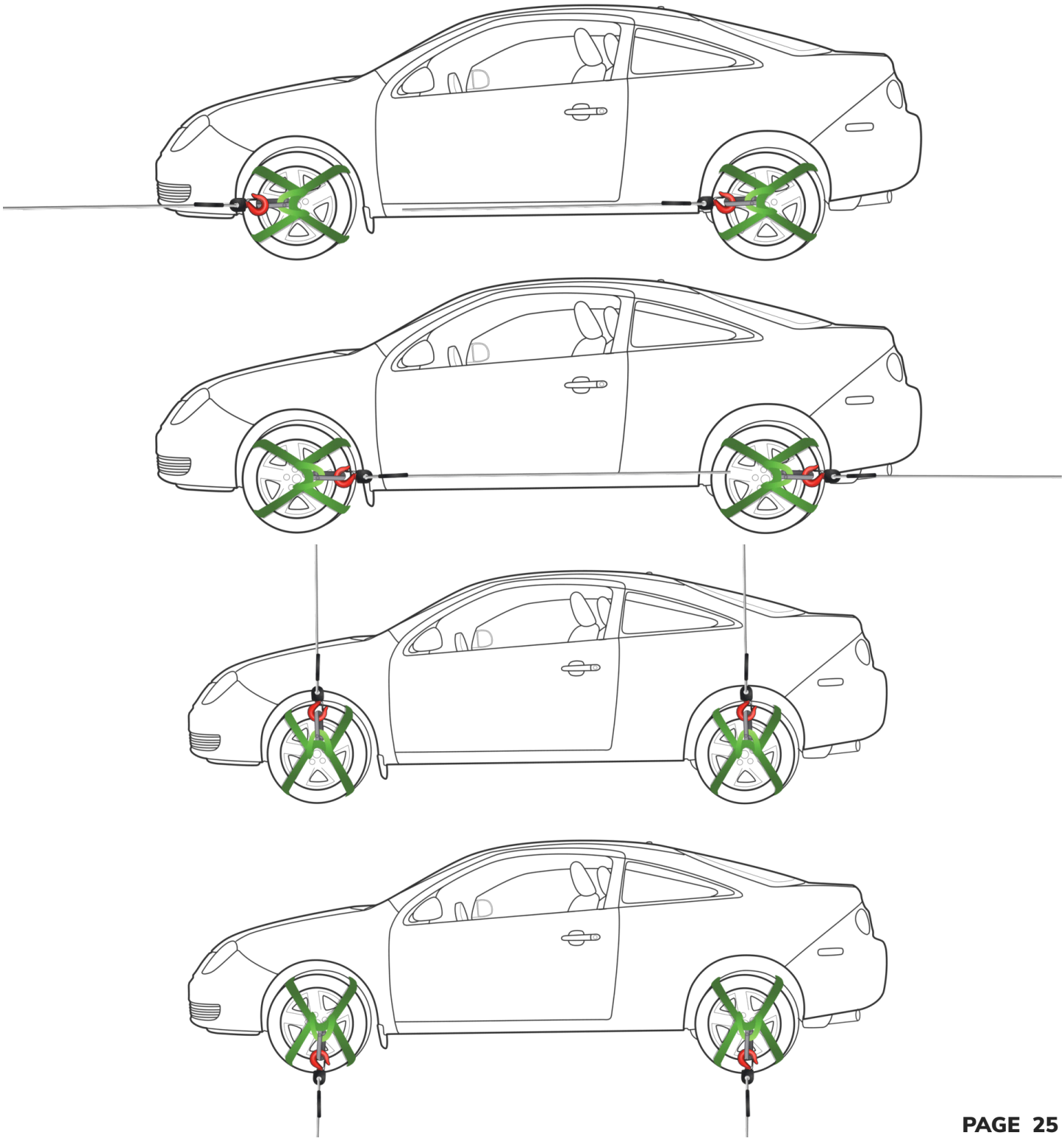
NOTE

VEER ANGLE RATIO -
LENGTH TWICE the **WIDTH**
(ratio of 2 to 1)



CONTINUOUS LOOP RECOVERY STRAPS

The Continuous Loop Recovery Straps should be installed in a manner that creates 4 points of contact with the tire & wheel (the 10 & 2 o'clock positions at the top and 5 & 7 o'clock positions at the bottom) for best results.



LOADING AND SECURING



1. After winching the vehicle onto the carrier deck, **INSTALL A FRONT TIE DOWN, IMMEDIATELY.**
2. Raise the edge of the deck off the ground surface by tilting slightly. This will prevent scraping the ground surface.
3. Once the edge of the deck has been lifted, begin to slide the deck forward. Continue sliding the deck forward until the majority of the casualty's weight passes the rear axle of the truck.



As shown above, the casualty's front axle is just forward of the trucks rear axle, distributing the weight over the deck rams. This will prevent the deck from 'floating' and putting extensive stresses on the hinge-pins and ram-mounts.

4. Once this position is reached, tilt the deck to 3°-5° above horizontal, and we are ready to install the rear securements.



IMPORTANT THINGS TO REMEMBER

1. At **NO TIME** should an operator permit **ANY** individual to place him/her self behind the deck of any carrier until after the load has been completely and properly secured.

2. The cab of a carrier or wrecker should have **NO MORE** occupants than the Manufacturer has supplied seatbelts for.

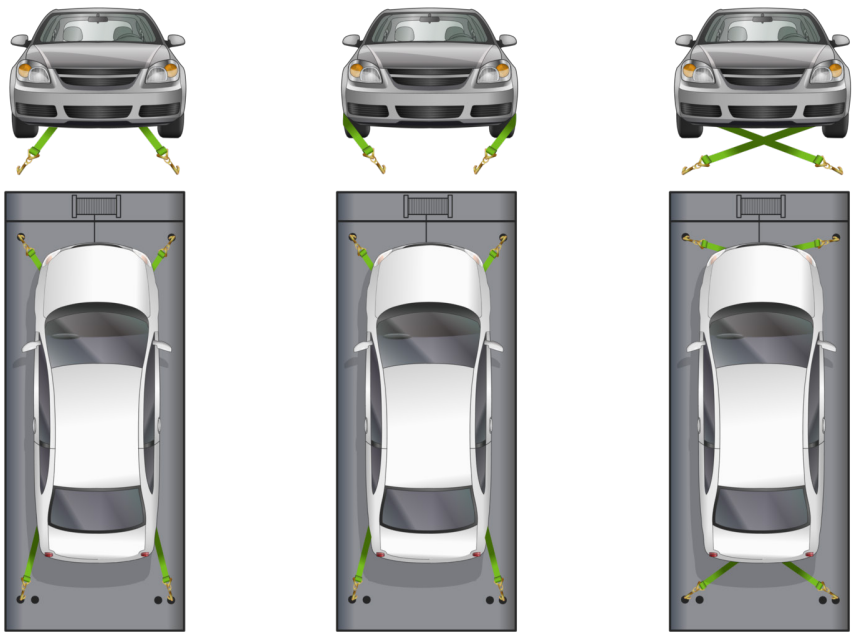
3. The primary function of rotating beacons or emergency lighting is to provide a **ROAD SIDE WARNING.**

NOTE

Engine RPM for PTO Operation - Idle to 1,000 RPMs or MANUFACTURER'S SPECIFICATION.

WRECKMASTER'S MANDATORY 4 POINTS OF SECUREMENT

Each securement device must have a means of adjustment. The image beside illustrates the **WreckMaster mandatory 4 Points of Securement**, which does not rely on the use of the winch to tighten or secure the load in full compliance of the Federal Motor Carrier safety regulations.



CALCUATE THE RESISTANCE

CASUALTY SPECIFICATIONS

STATIC WEIGHT: 46,000 lbs
FRONT AXLE: 12,000 lbs
REAR AXLE: 17,000 lbs each



Weight of Vehicle _____ lbs
Type of resistance _____
Level of resistance _____
Resistance factor (rate) _____
Surface Resistance _____ lbs

Weight of Vehicle _____ lbs
Type of resistance _____
Level of resistance _____
Resistance factor (rate) _____
Surface Resistance _____ lbs

Total Surface Resistance
_____ lbs

TOTAL RESISTANCE TO BE MOVED

Winching Source Static Weight
_____ lbs

FOR ANCHOR-ABILITY

CALCUATE THE RESISTANCE

CASUALTY SPECIFICATIONS

STATIC WEIGHT: 46,000 lbs
FRONT AXLE: 12,000 lbs
REAR AXLE: 17,000 lbs each

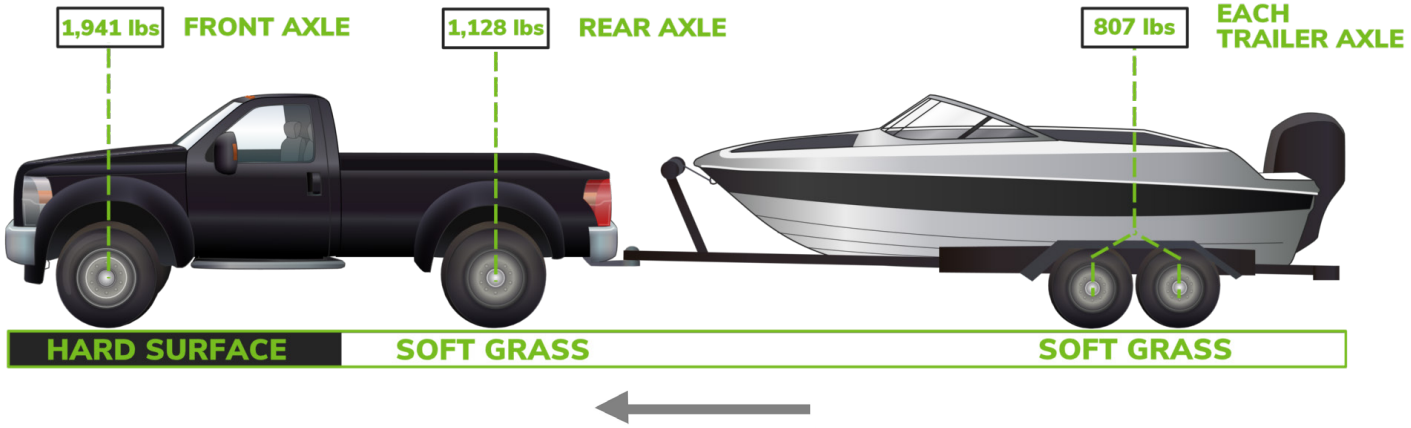


Weight of Vehicle _____ lbs	Weight of Vehicle _____ lbs	Weight of Vehicle _____ lbs
Type of resistance _____	Type of resistance _____	Type of resistance _____
Level of resistance _____	Level of resistance _____	Level of resistance _____
Resistance factor (rate) _____	Resistance factor (rate) _____	Resistance factor (rate) _____
Surface Resistance _____ lbs	Surface Resistance _____ lbs	Surface Resistance _____ lbs

Total Surface Resistance
_____ lbs

TOTAL RESISTANCE TO BE MOVED

CALCUATE THE RESISTANCE



Weight of Vehicle _____ lbs

Type of resistance _____

Level of resistance _____

Resistance factor (rate) _____

Surface Resistance _____ lbs

Weight of Vehicle _____ lbs

Type of resistance _____

Level of resistance _____

Resistance factor (rate) _____

Surface Resistance _____ lbs

Total Surface Resistance

_____ lbs

TOTAL RESISTANCE TO BE MOVED

Winching Source Static Weight

_____ lbs

FOR ANCHOR-ABILITY

CALCUATING TOW CAPACITY

1/2 FRONT AXLE WEIGHT multiplied by the WHEEL BASE divided by the OVERHANG

1/2 FAW X WB / OH

TOW TRUCK SPECIFICATIONS

FRONT AXLE: 4,600 lbs
REAR AXLE: 5,500 lbs
WHEEL BASE: 160 in
OVERHANG: 90 in



1/2 FRONT AXLE WEIGHT multiplied by the WHEEL BASE and divided by the OVERHANG

[ ] X [ ] = [ ] ÷ [ ] = [ ] TOW CAPACITY

TOW TRUCK SPECIFICATIONS

FRONT AXLE: 14,000 lbs
REAR AXLE: 13,000 lbs
WHEEL BASE: 300 in
OVERHANG: 125 in



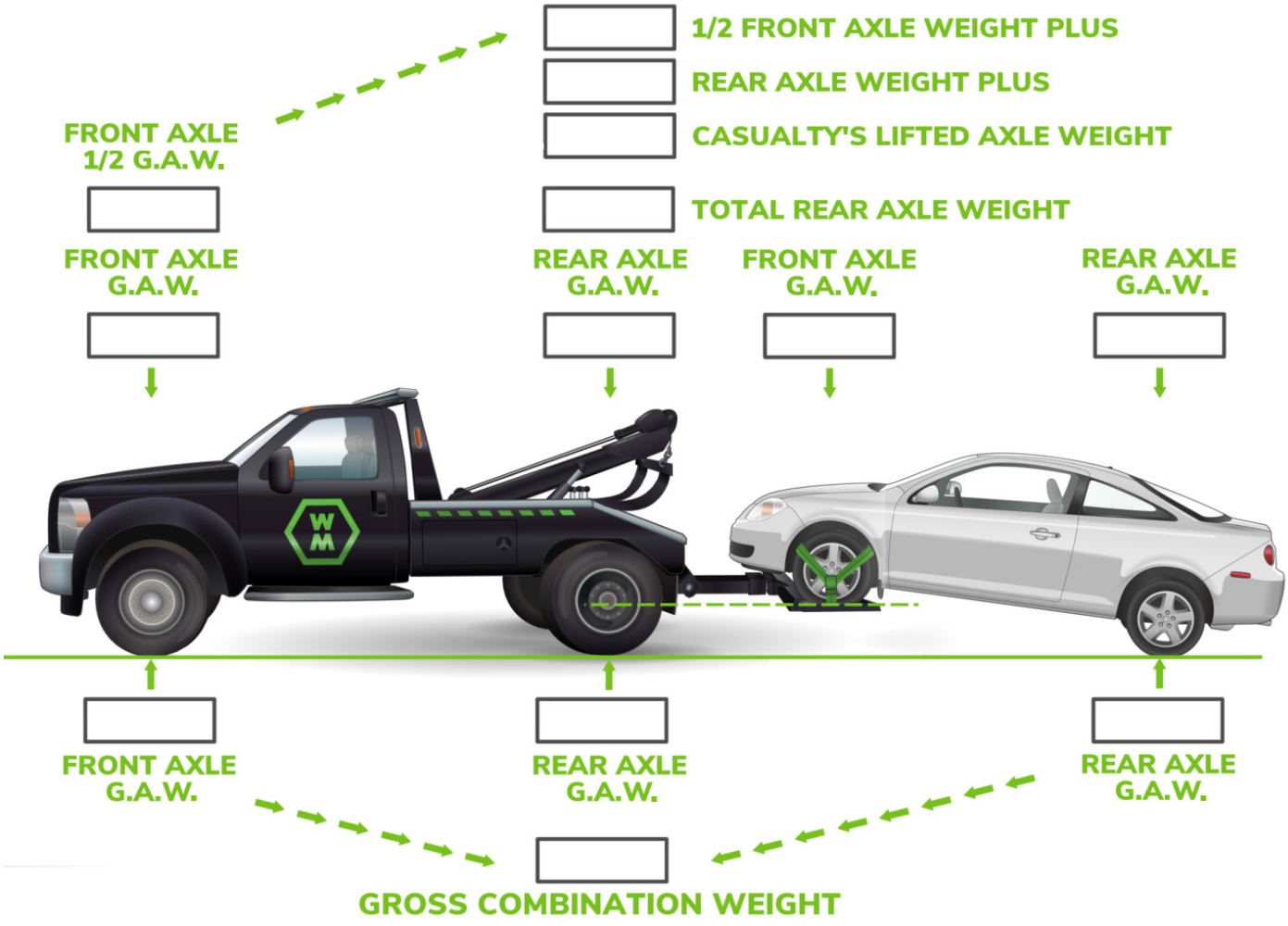
1/2 FRONT AXLE WEIGHT multiplied by the WHEEL BASE and divided by the OVERHANG

[ ] X [ ] = [ ] ÷ [ ] = [ ] TOW CAPACITY

WEIGHT TRANSFER

Gross Combination Weight is the total weight of all the axles touching the ground, or the total weight of the tow truck and total weight of the casualty added together.

Generally, the bottom of the casualty's lifted axle tire should be even with the center of the tow truck's drive tire as a starting reference point.





NOTE

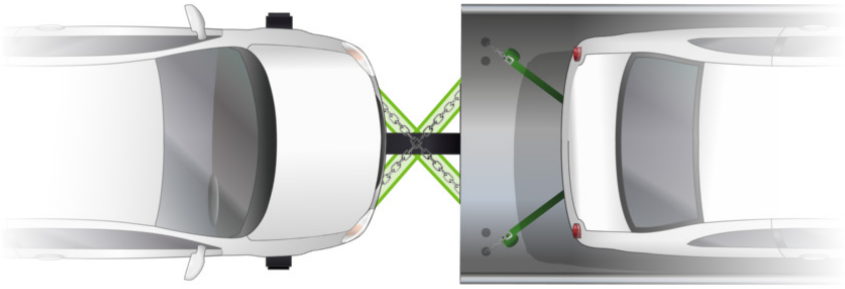
Two acceptable methods of securing a vehicle to the underlift - chains or straps.

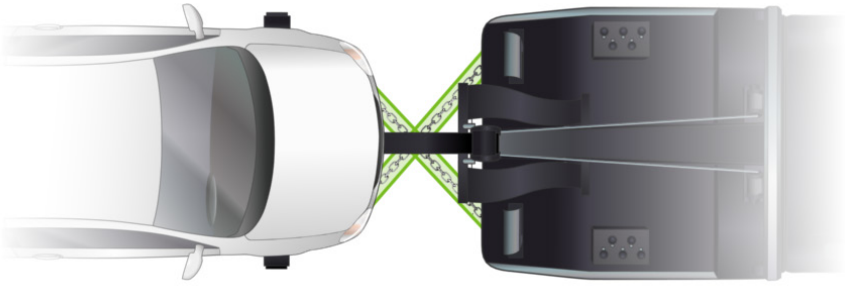
SECONDARY ATTACHMENT CHAINS

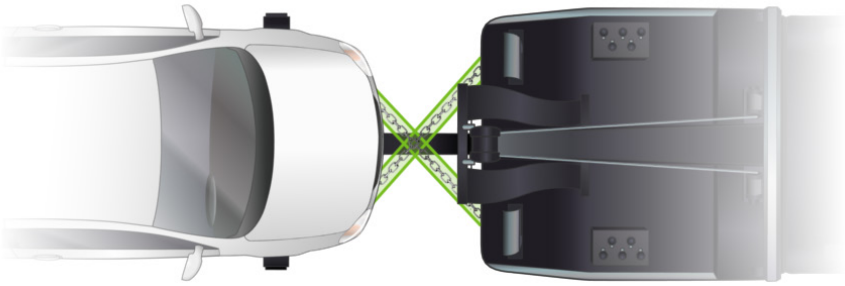
SECONDARY ATTACHMENT CHAINS are to be used on EVERY AND ALL TOWS.

The **SECONDARY ATTACHMENT CHAINS SHOULD BE CROSSED** to reduce excessive lengths of chain and keep them from dragging on the ground during turns.

They should also be **attached to an independent connection point from the primary attachment component.**







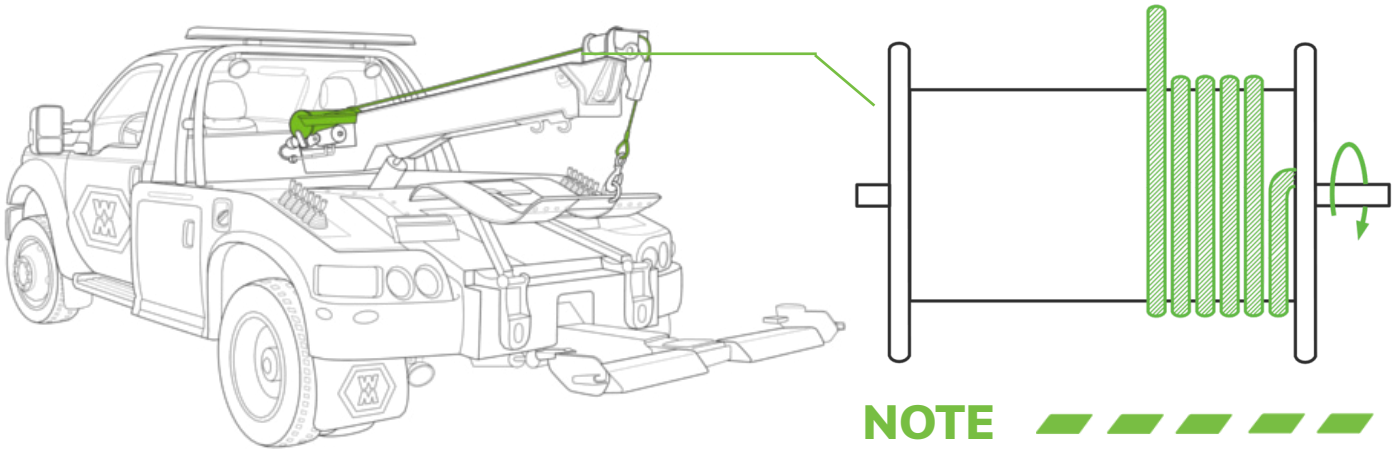
NOTE

EXTENSION LIGHTS; stop, turn, and tail lights, must be installed on **EVERY TOW**.



WIRE ROPE

WIRE ROPE is a **LIVE MACHINE** with one end attached to a power source - **THE WINCH**.

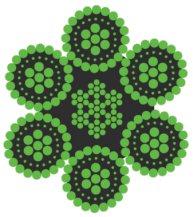


NOTE

A winch drum needs a **minimum of FIVE (5) WRAPS** of wire rope before engaging the winch and loading your wire rope.

WIRE ROPE IS NORMALLY CONSTRUCTED OF STRANDS & WIRES.

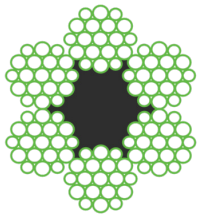
STEEL CORE



6 STRANDS X 37 WIRES

STEEL CORE: an independent wire rope core (IWRC) adds strength (7&1/2% min) and **provides a greater resistance to crushing** than fiber core wire rope. Wire rope is normally constructed of strands and wires.

FIBER CORE



6 STRANDS X 19 WIRES

FIBER CORE: This type of wire rope has a core composed of a natural product such as - **manila, jute, sisal**, or synthetic products such as - **polypropylene**. Synthetic products offer the advantage of **resistance to rotting, drying out and other forms of deterioration**. Fiber core is usually impregnated with lubricant during manufacturing that acts as an internal lubricant.

REMEMBER

Ultimate Load or Breaking Strength Ratings of wire rope applies **ONLY** to **NEW** or **UNUSED** wire rope.



6X19 CLASS Extra Improved Plow Steel (EIPS) - Right Regular Lay (RRL) based on Design Factor of 4 to 1				
WIRE	FIBER CORE	FIBER CORE	STEEL CORE	STEEL CORE
DIAMETER	W L L	U L	W L L	U L
3/8	3,350	13,400	3,750	15,000
7/16	4,550	18,200	5,100	20,400
1/2	5,900	23,600	6,650	26,600
9/16	7,400	29,600	8,400	33,600
5/8	9,200	36,800	10,300	41,200
3/4	13,100	52,400	14,700	58,800
7/8	17,700	70,800	19,900	79,600
1	22,950	91,800	25,850	103,400

ADVANTAGES OF SYNTHETIC VS. WIRE WINCH LINE ROPE

Synthetic winch lines are becoming increasingly popular as a replacement to steel wire rope, because they offer many advantages. Some of the advantages over traditional steel wire rope include:

- **Easier to handle:** The smooth surface has no burrs to cut your hands.
- **Flexible**: Even bird-nesting of the winch won't damage synthetic rope.
- **Lightweight:** Easier to carry and maneuver.
- **No memory:** No flat spots or kinks.
- **Better in water:** Synthetic rope floats.



SYNTHETIC WINCH LINES

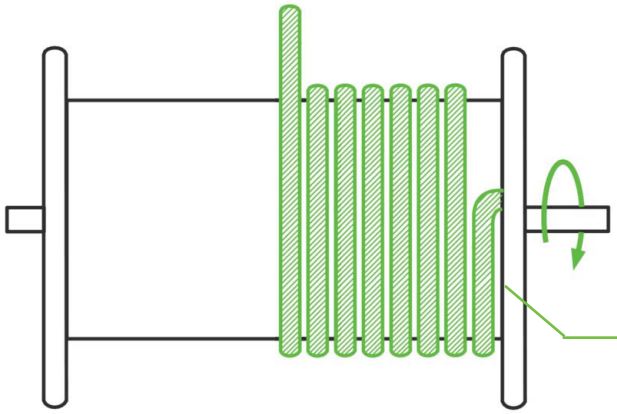
Material used varies by manufacturer. Some materials used are polyethylene, MFP Blend Polyester or par-aramid synthetic fiber.

Brand names associated with these types of synthetic fiber material are: Dyneema, Spectra and Kevlar.

Manufacturers such as Samson and Atlantic Baird for example, make these synthetic fibers and weave or braid them into synthetic ropes used in the Towing/ Recovery, Logging, Construction, Utility, Fire/Rope Rescue, Off-road/ ATV and Aerospace Industries.

PREPARATION & CONVERSION TO SYNTHETIC WINCH LINE

If installing synthetic rope on a winch that had previously used steel winch line, inspect all surfaces the steel line touched for burrs or sharp edges. This includes the winch drum, roller fair lead, tensioner, snatch blocks, side-pullers, or even sheave wheel guides. If a burr or edge is found it must be removed with a file, grinder or steel brush. Once cleaned, attach the synthetic winch line according to the manufacturer's instructions.



REMEMBER

- Like steel winch line, avoid shock loading the line.
- Knots in the line will reduce its pulling capacity.
- Avoid sparks or temperatures above 158ºF that can burn or melt the line.
- Synthetic winch lines require a minimum of **SEVEN (7) WRAPS** around the winch drum to maintain its grip on the winch drum.

INSPECTING SYNTHETIC WINCH LINE

Just like steel winch line, synthetic winch lines should be inspected prior to each use. When using synthetic winch line, be on the lookout for signs of damage or wear:



REGULAR WEAR

This is typical and has a slight fuzzy look or color fading caused by abrasion. The rope can still be used: Watch closely for further, more serious signs of wear.



COMPRESSION DAMAGE

This shows as a more visible sheen and stiffness than the rest of the rope. This is often caused by setting the fiber around a winch drum or hook. Can be corrected: Bend rop back and forth to remove compression.



PULLED STRAND

A strand protruding from rest of rope.
Can be corrected: Work the strand back in the rope by pulling back and forth.



CHEMICAL DEGRADATION

This shows as fused or bonded fibers, discoloration or brittleness.
Replace this rope immediately.



HEAT DEGRADATION

Fused or melted fibers that are very stiff and can't be loosened by bending.
Replace this rope immediately.



INCONSISTENT DIAMETER

Tight flat areas that look like a strand or strands have been pulled tight. These are typically caused by a broken or pulled internal strand or shock loading. Replace this rope immediately.



VOLUME REDUCTION/ CUT STRANDS

Reduced size of strands and/or rope diameter. These are broken strands caused by cuts, abrasion, sharp surfaces, or fatigue. When any strand is completly or partially cut, the entire line is compromised. Replace this rope immediately.

INSPECTING WIRE ROPE

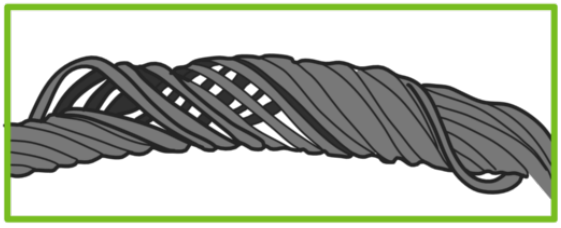
OSHA(1926.1413) recommends that wire rope be inspected each day before use by a qualified person, and at minimum annually by a qualified rigging inspector. WreckMaster also recommends inspecting and re-spooling under load after any recovery.

When using wire rope, be on the lookout for signs of damage or wear:

BIRDCAGE



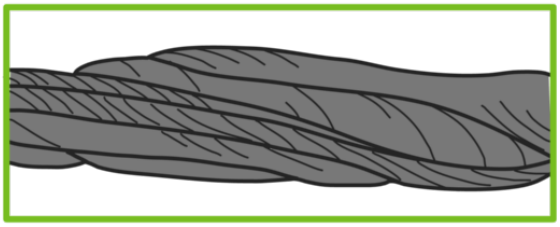
EXCESSIVE CLEARANCE BETWEEN STRANDS



DOG-LEG KINK



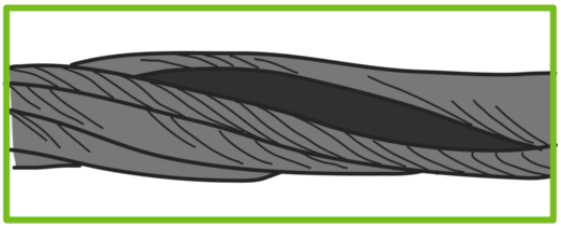
BULGED SEVERLY



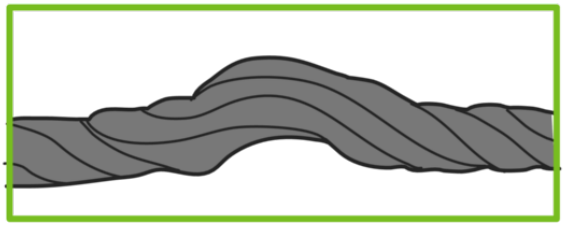
KINK



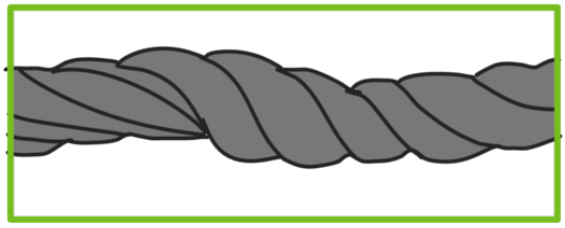
CORE PROTRUSION



OPEN KINK



CLOSED KINK

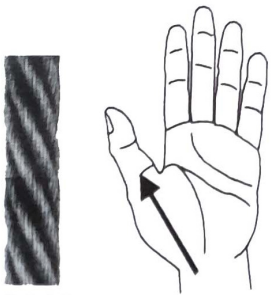


WIRE ROPE TERMINATIONS

Wire Rope Efficiency Ratings are based on the Manufacturers U.L. (Ultimate Load) or Breaking Strength Rating.

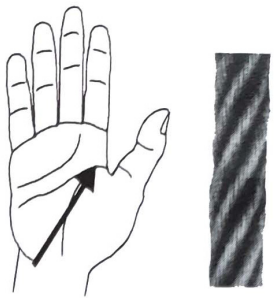
NOTE: Recommended wire rope lubricant is an Asphalt or Moly based product.

LEFT-LAY

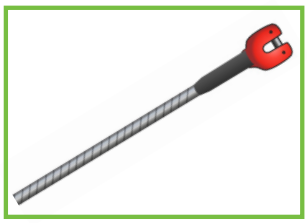


(Left Hand)

RIGHT-LAY

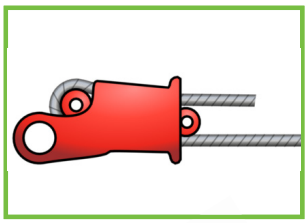


(Right Hand)



OPEN SWAGE SOCKET-SWAGED

Efficiency Rating - is 100%



WEDGE & SOCKET

Efficiency Rating - is a Minimum of 80%.



MECHANICAL SPLICE SWAGE

Efficiency Rating - 1/4” - 1” wire rope is 93% for fiber core, 96% for steel core wire ropes, with a properly flemished eye or prepared loop, and correct swage sleeve.



WIRE ROPE CLIP

Efficiency Rating - 1/8”-7/8” is Maximum of 80% with a properly prepared loop and clip installation.



NOTE

Proper termination procedures for SYNTHETIC WINCH LINE must be followed. Not doing so may result in damage, injury, or loss of life. For assistance and procedures, consult your rigging supplier for proper termination of your type of Synthetic Winch Line Rope. The termination type effects the rope’s Efficency Rating.

CHAIN

GRADE	SIZE	W L L	U L
120 ALLOY 4:1 Design Factor	5/16	6,600	26,400
	3/8	10,600	42,400
	1/2	17,900	71,600
100 ALLOY 4:1 Design Factor	1/4	4,300	17,000
	5/16	5,700	22,800
	3/8	8,800	32,200
	1/2	15,000	60,000
	5/8	22,600	90,400
80 ALLOY 4:1 Design Factor	1/4	3,500	14,000
	5/16	4,500	18,000
	3/8	7,100	28,400
	1/2	12,000	48,000
	5/8	18,100	72,400
70 TRANSPORT 4:1 Design Factor	1/4	3,150	12,600
	5/16	4,700	18,800
	3/8	6,600	26,400
	1/2	11,300	45,200
40 HIGH TEST 3:1 Design Factor	1/4	2,600	7,800
	5/16	3,900	11,700
	3/8	5,400	16,200
	1/2	9,300	27,600



LOK-A-LOY
(HAMMERLOCK)

The alloy LOK-A-LOY (also known as Hammerlock) is an acceptable metod of joining chain components together, such as J-Hooks, R-Hooks, Grab Hooks or other sections of chain.



GRADE 8

G-8 ALLOY 4:1 Design Factor		
SIZE	W L L	U L
1/4	3,500	14,000
5/16	4,500	18,000
3/8	7,100	28,400
1/2	12,000	48,000
5/8	18,100	72,400

REMEMBER

- Two factors to consider when selecting chain- **SIZE & GRADE**.
- Quenched & Tempered-**A heat treating process**.
- Grade 7 & Lower Grades are **not** recommended for **OVERHEAD LIFTING**.
- Rigging will only be as strong as the weakest link or lowest grade in the assembly.

HOOKS & PLACEMENT

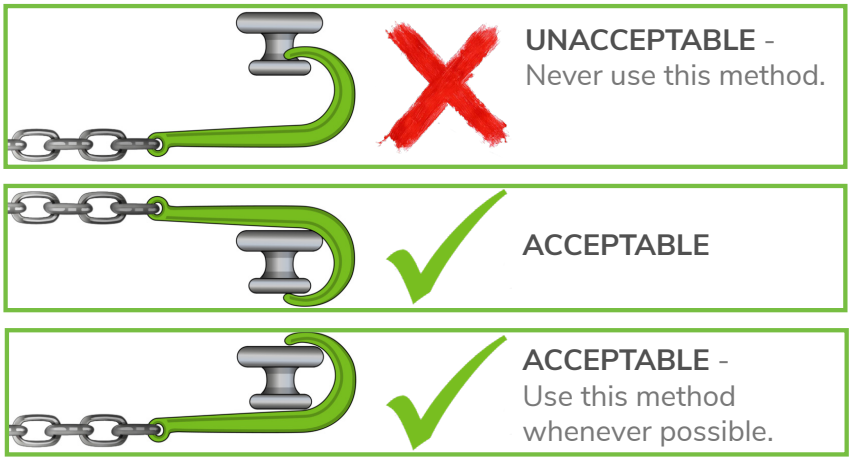
TYPES OF HOOKS



Eye Sling | Grab | Mini-J | R-Hook | T-Hook

PLACEMENT

An **INFORMED** operator attaches a hook with the **TIP POINTED UP, WHENEVER POSSIBLE.**
See below for acceptable methods of positioning:

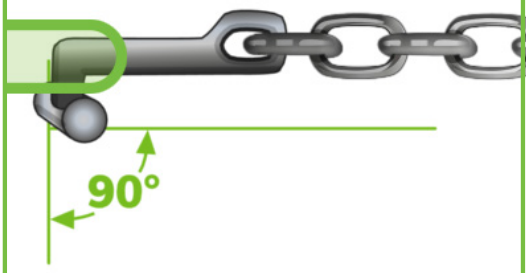


UNACCEPTABLE -
Never use this method.

ACCEPTABLE

ACCEPTABLE -
Use this method whenever possible.

T-HOOKS



T-Hooks must be positioned 90° to the slot, while under a load.

DESIGN FACTORS & RATINGS

WORKING LOAD LIMIT (W.L.L)

The maximum mass or force which the product is authorized to support in general service when the pull is applied in-line; unless noted otherwise, with respect to the centerline of the product.

ULTIMATE LOAD (U.L)

The average load or force at which the product fails or no longer supports the load.

DESIGN FACTOR

An industry term denoting a product's theoretical reserve capability; usually computed by dividing the catalog ultimate load by the Working Load Limit. Generally expressed as a ratatio;
e.g. 4 to 1 or 5 to 1-4:1 or 5:1

HARD RIGGING

The Design Factor

Generally, shackles that incorporate synthetic parts may use a design factor of 5:1 or higher.

Note: The Design Factor for wire rope and synthetic winch line varies and is generally set or determined by the industry using it.

Example:

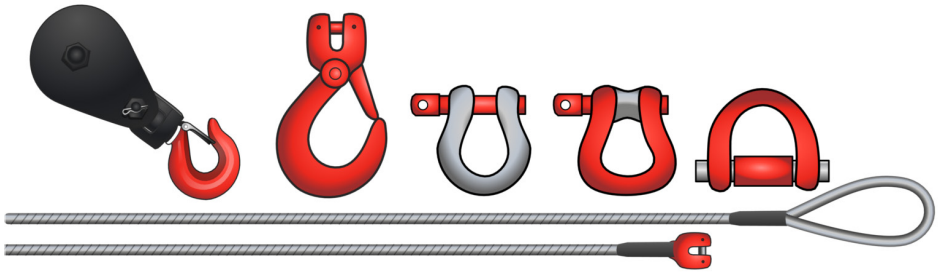
3/8" GRADE 8
W.L.L - Strength at 7,100 lbs



To find the **Ultimate Load** - Multiply by the Design Factor.
Design Factor 4:1 x W.L.L. 7,100 lbs = U.L. 28,400 lbs.

To find the **Working Load Limit** - Divide by the Design Factor.
Design Factor 4:1 divide by U.L. 28,400 lbs = W.L.L. 7,100

GRADE
120 ALLOY
100 ALLOY
80 ALLOY
70 TRANSPORT
40 ? HIGH TEST



SOFT RIGGING

The Design Factor

Synthetic Straps -
Design Factor: 5:1
Tie Down Straps: 3:1

Example:



Continuous Loop
& Cruse Loop

ONE LANE PARALLEL UP-RIGHTING

Three steps an operator should consider upon arriving at the scene of any incident are:

1. STAGING

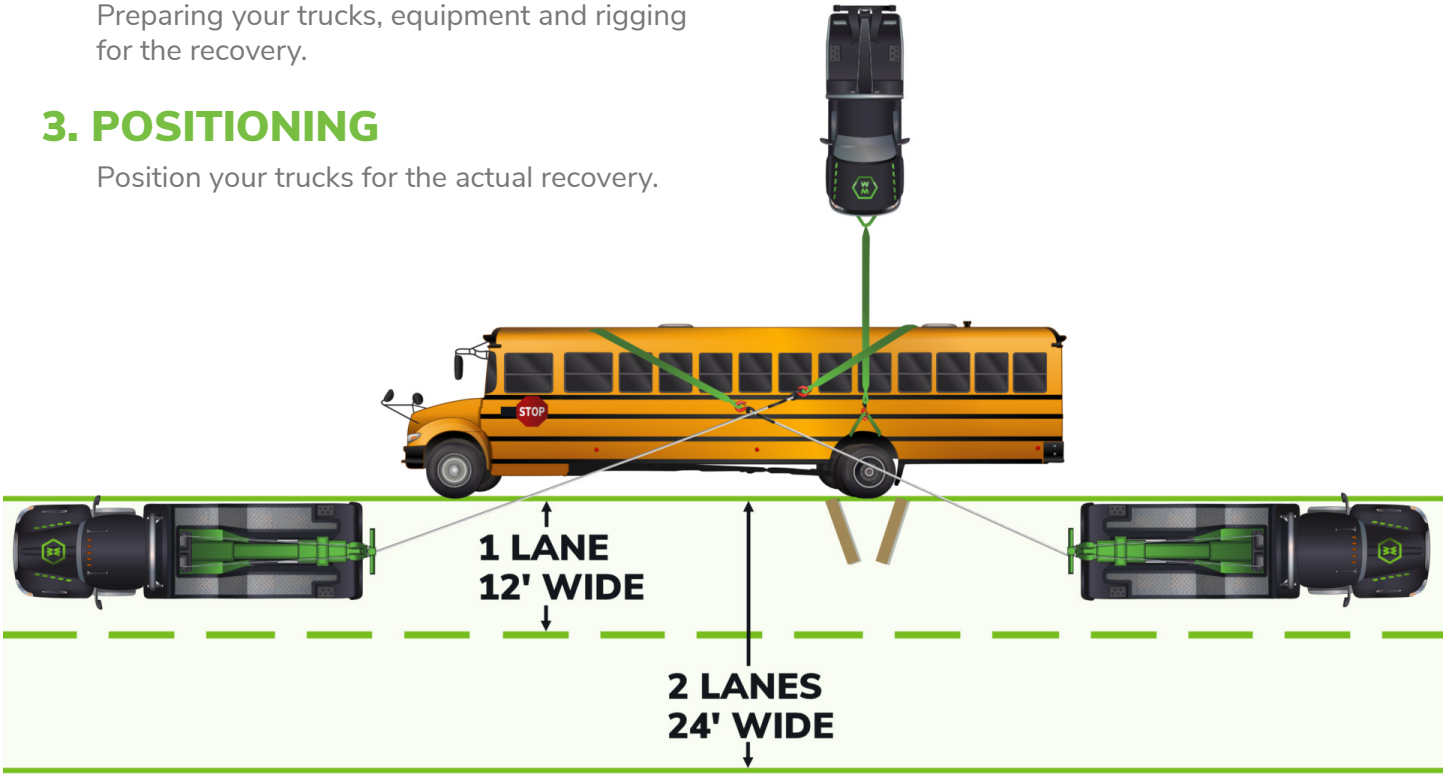
Park your trucks and equipment in a designated area.

2. PREPARING

Preparing your trucks, equipment and rigging for the recovery.

3. POSITIONING

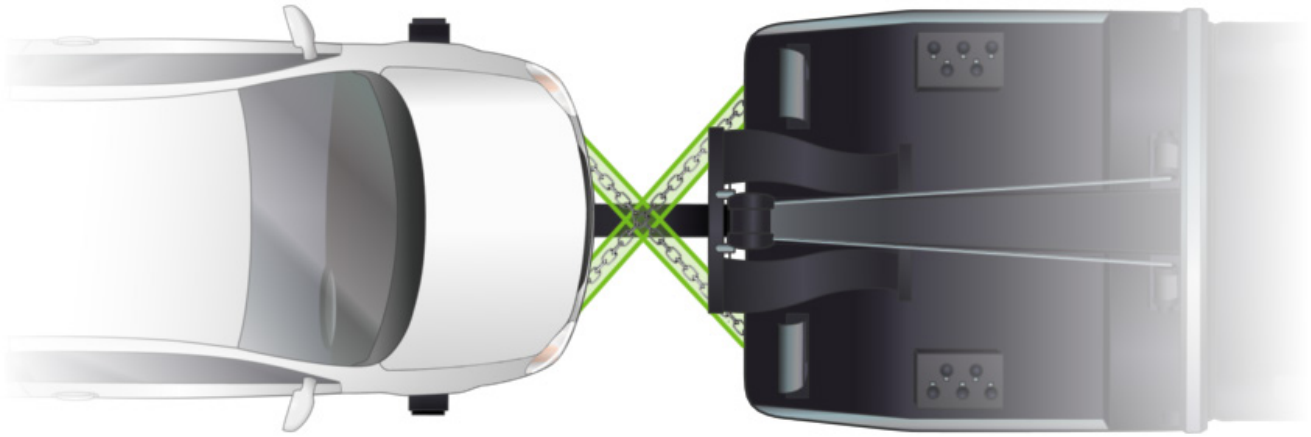
Position your trucks for the actual recovery.



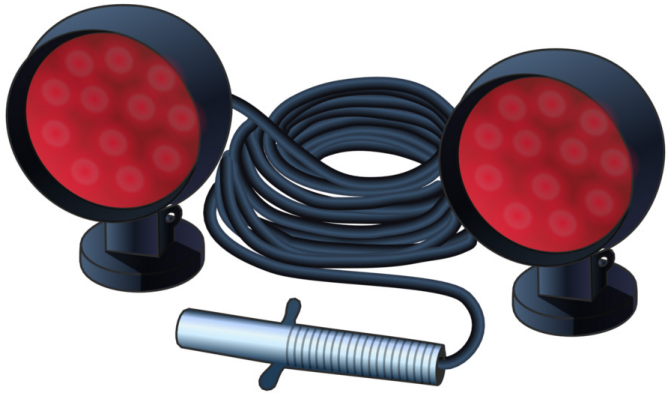
ATTACHMENTS - SECUREMENT

The following **MUST** be performed on **ALL TOWS:**

- Secondary attachment chains must be used on any and all tows.



- Extension lights; stop, turn & tail, must be used on any and all tows.



- The front tires and wheels must be straightened and secured on any and all tows.



YOU HAVE A CHOICE

Throughout this booklet you have been given information and skills enabling you to choose more wisely, the path you wish to follow. You have many choices and you many not wish to take the WreckMaster Pledge. If you do not wish to take the pledge, that is your choice and your choice alone.

If you choose to take and abide by this pledge, all of WreckMaster congratulates you. We encourage you to choose the path leading to respect and success and to set an example all in the towing industry can be proud of. It is you and others like you that will surely be instrumental in raising the bar for others in our industry to emulate.

THE WRECKMASTER PLEDGE

As long as I freely choose to be a professional wrecker operator, I will never again, never again speak ill of a fellow operator, because I know that operator is doing the best they can with the tools they have.



Winners VS Losers

A winner works harder than a loser and has more time. A loser is always “too busy”: to do what is necessary. A winner goes through a problem. A loser tries to go around it and never gets past it. A winner makes commitments. A loser makes promises. A winner says, “I’m good, but not as good as I ought to be”. A loser says, “I’m not as bad as a lot of other people”. A winner listens. A loser just waits until its their turn to talk. A winner feels responsible for more than their job. A loser says, “That’s the way its always been done here”.

It’s **YOUR CHOICE**...It’s a way of life. Winners and Losers. WreckMaster was created for Winners.