

Calculating for Safe Braking and Steering

The weight wheel lifts can lift and tow safely varies. Keep in mind the following:

- The wheel-lift rating assigned by the manufacturer is designed to prevent damage to its product, not to allow for safe braking or steering.
- The wheel-lift manufacturer has no idea what chassis its wheel lift will be attached to.
- The weight of the lifted end of the vehicle is transferred onto the truck's rear axle.
- Since the lift point of the vehicle is behind the tow truck's rear axle, weight is transferred from the front axle of the truck to the rear axle.
- Lifting a load equal to the wheel-lift rating may not be safe if too much weight is transferred from the truck's front axle.
- Depending on the chassis being used, the maximum load specified by the manufacturer can either exceed the rear axle rating or transfer more than 50 percent of the weight from the front axle of the tow truck.
- Never lift and tow a load that reduces the front axle weight of the tow truck by more than 50 percent.
- If the exact weight of the tow truck's front axle is known, it is possible to determine how much weight can be lifted safely in the extended, retracted and mid-point positions.
- The following steps should be followed to determine how much weight a tow truck can lift and tow and still have at least 50 percent of its static front axle weight remaining on the front axle:
 1. The tow truck should be weighed with the truck full of fuel, all equipment aboard, and the driver inside the cab, taking separate readings for the front and rear axle weight. These will be the static axle weights for the tow truck.
 2. The wheelbase should be measured in inches. The wheelbase is the distance between the center of the truck's front axle and the center of the rear axle.
 3. The overhang should be measured in inches, both in the retracted and extended positions. The mid-point distance can be calculated from these measurements by subtracting the retracted distance from the extended distance and dividing by 2. The overhang is the distance from the center of the truck's rear axle to the center of the axle of the lifted wheels of the towed vehicle.
 4. The static front axle weight of the tow truck should then be divided by 2.
 5. Results from Step 4 should be multiplied by the truck's wheelbase.
 6. Results from Step 5 should be divided by the retracted overhang to determine the maximum safe steering load with the wheel lift in the retracted position.
 7. Results from Step 5 should be divided by the mid-point overhang to determine the maximum load for safe steering with the wheel lift extended to its mid-point.
 8. Results from Step 5 should be divided by the extended overhang to determine the maximum safe steering load with the wheel lift in the extended position.



Example: Assume the truck has a front axle weight of 5,000 pounds, a wheelbase of 130 inches, and an overhang of 85 inches retracted, 97.5 inches to the mid-point and 110 inches extended.

½ STATIC FRONT AXLE WEIGHT x WHEEL BASE IN INCHES
OVERHANG IN INCHES

- 5,000 pounds divided by 2 = 2,500 pounds
- 2,500 pounds x 130 inches = 325,000 pounds inches
- 325,000 pounds inches divided by 85 inches = 3,824 pounds
- 325,000 pounds inches divided by 97.5 inches = 3,333 pounds
- 325,000 pounds inches divided by 110 inches = 2,955 pounds

In the above example, the truck could safely support 3,824 pounds in the retracted position, 3,333 pounds half way extended and 2,955 pounds in the fully extended position, and still retain enough weight on the front axle for safe steering and braking.

Rear axle load considerations:

The weight that came off the front axle does not vanish; it is transferred to the rear axle of the tow truck along with the lifted weight of the towed vehicle. Using weights attained from the calculation above, the static rear axle weight of the tow truck and the gross rear axle weight rating (GRAWR) as determined by the chassis manufacturer, the following calculations must be made to ensure that you are not overloading the rear axle of the truck even though you are maintaining 50 percent of the static front axle weight when loaded.

Static rear axle weight =	5,000 pounds
Gross Rear Axle Weight Rating (GRAWR) =	11,000 pounds
Weight transferred from front axle (from examples above) =	2,500 pounds (retracted) 2,500 pounds (mid-point) 2,500 pounds (extended)
Weight of lifted end of towed vehicle=	3,824 pounds (retracted) 3,333 pounds (mid-point) 2,955 pounds (extended)

Static rear axle weight + weight transferred + towed vehicle lifted weight =

Retracted	5,000 pounds + 2,500 pounds + 3,824 pounds = 11,324 pounds
Mid-point	5,000 pounds + 2,500 pounds + 3,333 pounds = 10,833 pounds
Extended	5,000 pounds + 2,500 pounds + 2,955 pounds = 10,455 pounds

The retracted figures above indicate that this tow truck cannot safely tow a vehicle with a lifted axle weight of 3,824 pounds as it would overload the rear axle of the tow truck. Since it is very seldom that you would actually tow a vehicle with the wheel lift fully retracted, a maximum safe load on this particular tow truck would be between 3,000 and 3,400 pounds, depending on how far out the wheel lift is when towing a vehicle.

Source: AAA June 2004

