# Vehicle Weight Transfer in Braking and Cornering

Axle loads in braking or acceleration and lateral load transfer in cornering from centre-of-gravity height, wheelbase, track and accelerations.

**Method:** Load transfer ΔW = ma h/L and ΔW = ma_y h/t (Gillespie, Fundamentals of Vehicle Dynamics (SAE, 1992), ch. 3 and 9)

## Input parameters

Unit system: SI

| Parameter | Value | Unit |
|---|---|---|
| Vehicle mass | 1,500.0 | kg |
| Static front axle weight share | 58.000 | % |
| Centre-of-gravity height | 0.55000 | m |
| Wheelbase | 2.6500 | m |
| Track width | 1.5500 | m |
| Braking deceleration (in g) | 0.80000 | |
| Lateral acceleration (in g) | 0.60000 | |

## Calculated results

| Parameter | Value | Unit |
|---|---|---|
| Longitudinal load transfer | 2.4424 | kN |
| Front axle load while braking | 10.974 | kN |
| Rear axle load while braking | 3.7358 | kN |
| Lateral load transfer (whole vehicle) | 3.1318 | kN |
| Rollover threshold t/2h (in g) | 1.4091 | |

### Notes for this case

- Rigid vehicle, no suspension or aerodynamic effects. Enter negative deceleration for acceleration (load moves to the rear). Real rollover occurs below the static t/2h threshold because of suspension roll.

## Formula and method

$$\Delta W_x = W a_x \frac{h}{L}, \quad \Delta W_y = W a_y \frac{h}{t}, \quad a_{y,roll} = \frac{t}{2h}$$

### Variables

| | | |
|---|---|---|
| $m$ | Vehicle mass | kg |
| $f_f$ | Static front axle weight share | - |
| $h$ | Centre-of-gravity height | m |
| $L$ | Wheelbase | m |
| $t$ | Track width | m |
| $a_x$ | Braking deceleration (in g) | - |
| $a_y$ | Lateral acceleration (in g) | - |
| $\Delta W_x$ | Longitudinal load transfer | N |
| $W_f$ | Front axle load while braking | N |
| $W_r$ | Rear axle load while braking | N |
| $\Delta W_y$ | Lateral load transfer (whole vehicle) | N |
| $a_{y,roll}$ | Rollover threshold t/2h (in g) | - |

### Method and standards

Moment balance.

### Assumptions and limits

- The page warns when an axle load comes out negative (wheel lift-off) or when the lateral acceleration exceeds t/2h (lateral transfer above half the weight); beyond those points the results have no physical meaning.
- Rigid body; steady acceleration.

### References

- Load transfer ΔW = ma h/L and ΔW = ma_y h/t (Gillespie, Fundamentals of Vehicle Dynamics (SAE, 1992), ch. 3 and 9)

## Report details

| | |
|---|---|
| Report reference | FCC-5RVF-A135 (the same inputs always give the same reference) |
| Generated | 17 November 2026, 19:50 UTC |
| Calculator | Vehicle Weight Transfer in Braking and Cornering |
| Method last reviewed | 13 November 2026 |
| Software release | FireCAD Calc, release of 17 November 2026 |
| Release checks | 2 reference cases of this calculator, computed independently, are checked on every release |

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

### This calculator online

https://calc.firecad.com/automotive/vehicle-dynamics/vehicle-weight-transfer

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.