ABS, EBS, ESC, RSC & DYNAMIC STABILITY

Generally there is trade-off between low speed manoeuvrability and high speed dynamic stability.

If a vehicle is configured to have good low speed manoeuvrability so that it can get around narrow winding roads better it will have poorer high speed dynamic stability and vice versa. The 23m 50MAX vehicle does not manoeuvre as well as the 20m vehicle but will, in principle, have better high speed dynamic stability.

However, the typical 50MAX vehicle has proportionately more weight on the trailer than the 20m 44t vehicle which increases the "pendulum" effect during high speed lane change manoeuvres. This extra weight offsets the benefit of the additional length.

The ideal braking system brakes each wheel in proportion to the load on that wheel.

To get close to the ideal the Heavy Vehicle Brake Rule requires that each axle brakes proportionately to its load within a tolerance band both while empty and laden.

Achieving this requires vehicles to be fitted with either load sensing valves or ABS or EBS. Log trailers were exempt from this requirement because they are "piggy-backed" and do not run empty. 50MAX HPMVs are not exempt and 50MAX vehicles will be fitted with ABS or EBS brakes.

ABS and EBS brakes sense when the wheels are about to lock up and modulate the brake pressure to prevent lock-up. The main difference between EBS and ABS is that EBS uses electrical signals to actuate the brakes where ABS uses the air signal from the pedal. Thus EBS has a faster response time and can react more quickly to inputs from the wheel sensors. This allows for more sophisticated brake control.

An EBS system can be used to provide additional safety systems to the vehicle such as roll stability control (RSC) and electronic stability control (ESC).

Different vehicle manufacturers use different acronyms and so ESC is also called ESP, VSC, VSA, VDC, YDC etc. The EBS system monitors the vertical load on each of the wheels.

With RSC, the system detects when too much of the weight has shifted from one side of the vehicle to the other and applies the brakes to slow the vehicle down and prevent the rollover.

With ESC, the system detects when the direction that the vehicle is actually moving differs from its intended direction and actuates the brakes on one side of the vehicle to get it back into line.

There are some important points to note:

RSC and ESC are only actuated when the vehicle is in trouble, i.e. on the verge of rollover or loss-of-control.

If the ESC or RSC system is being activated on a regular basis during your normal driving, either it is incorrectly set up or you are driving too fast for the capabilities of the vehicle.

RSC and/or ESC are very effective but they cannot save you in all circumstances. If the trailer goes off the edge of the road and slides into the drainage ditch, the system will detect that the vehicle is sliding sideways and rolling over but it cannot fix it by braking. If you respond with a sharp steering action in the truck, you may well make things worse.

You should respond to an ESC/RSC activation by continuing to steer as you normally would in such situations, and you should continue pushing the accelerator or brake pedal as you think necessary.

Hard braking or acceleration is likely to make things worse.

Prepared for the Log Transport Safety Council by TERNZ

TERNZ TRANSPORT RESEARCH

What are the differences between a standard 44 tonne log truck and a 50MAX log truck?

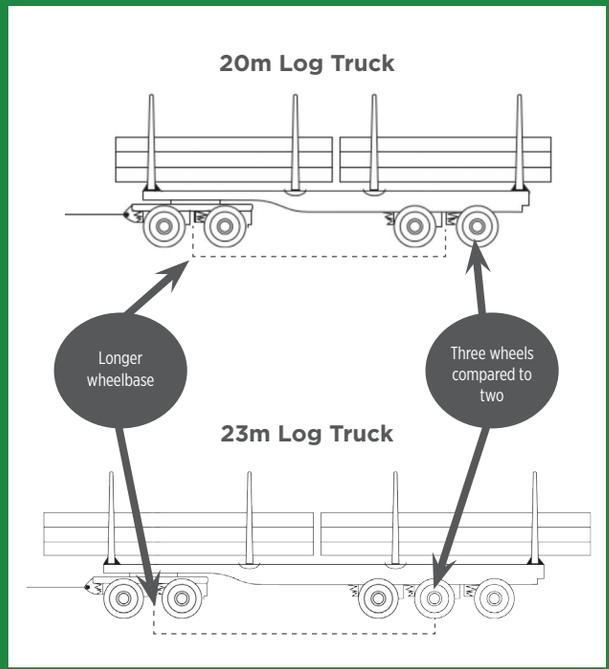
LOG TRANSPORT SAFETY COUNCIL

www.logtruck.co.nz

THE OBVIOUS

COMPARISON	44 Tonne Truck	50 Max Tonne Truck
Trailer Length	**20m**	**23m**
Spacing Between Axles	**16.5m**	**20m+**
Weight		**+ 6 tonnes ***

* Because of the extra axle about 1 tonne of this weight is tare. The other 5 tonnes is payload and most of this will be on the trailer.



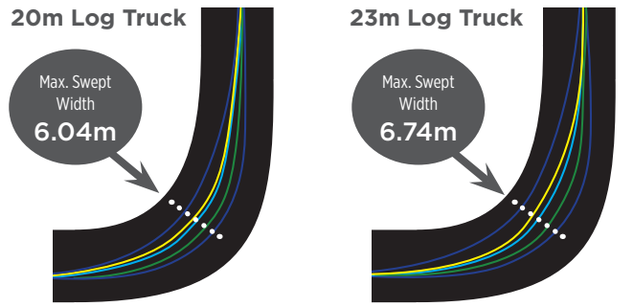
How does this affect the vehicle's performance?

1 OFF-TRACKING **2 ROLLOVER STABILITY** **3 BRAKING**

OFF-TRACKING

During low speed turns all vehicles off-track to the inboard side and so they all require extra road width.

The amount of extra road width required depends on the length and configuration of the vehicle and the radius of the turn. The figures below show the path of the axle centres for both vehicle type during a sharp 90° turn taken at 5km/h. This is roughly equivalent to turning left at a T-junction.



The 23m vehicle needs 700mm more road width than a 20m vehicle to do a sharp 90° turn!

During high speed turns, vehicles off-track to the outboard side and again they need extra road width. For a sweeping bend taken at 90km/h, the off-tracking for the 23m vehicle is 394mm compared to 335mm for the 20m vehicle, so the longer vehicle is about 60mm worse.

ROLLOVER STABILITY

The rollover stability of a vehicle is characterised by its Static Rollover Threshold (SRT).

The SRT depends on various vehicle design factors which you can't change and on the height of the load. Generally the SRT of the trailer is worse than that of the truck and if a rollover occurs, the trailer rolls first.

Whether the 23m 50MAX trailer is more or less stable than the 20m standard trailer depends on the length of the logs being transported and how they are loaded.

Log length	Trailer load configuration		More stable vehicle
	20m truck	23m truck	
Short (less than 5m)	**Two packet**	**Two packet**	**20m trailer**
Medium (between 5m and 6.1m)	**Single packet**	**Two packet**	**23m trailer**
Long (more than 6.1m)	**Single packet**	**Single packet**	**20m trailer**

Be aware, if the load configuration is the same on both trailers, the load on the trailer of the 50MAX vehicle will be heavier and higher which will make its rollover stability worse!