

# Western Log Truck Study

## Improvements to Dynamic Stability

### Background

The Forest Engineering Research Institute of Canada (FERIC), performed vehicle dynamic research into common log truck configurations during the Western Log Truck Study between 1992 and 1998. The main conclusion of this study was that the majority of existing logging trucks failed to meet the minimum criteria for safety performance, when hauling Alberta winter weights.

During 1999 and 2000, FERIC undertook a supplementary project to determine what improvements could be made to bring the safety performances up to the minimum standard. Based on the results of this study, recommendations for the specifications of logging trucks have been developed.

### Possible Improvements

#### 1. Wide track axles:

- (a) FERIC studied the effects of increasing the track width of the trailer axles to a minimum of 2.9 metres (9.5 feet). The trailer beams and suspension to frame connection points were also widened to provide a wide stance of the vehicle to increase lateral stability and reduce the potential for rollovers.
- (b) The results indicated that increasing the track width provided the most benefit to vehicle performance. In many cases, this one improvement increased the vehicle performance to the minimum standard.
- (c) Increasing the track width provides an obvious change to the looks of the vehicle which would make it apparent to anyone that the vehicle has this feature.
- (d) Installing wide track axles would limit these vehicles to logging trucks only and they would not be able to be used for any other purpose. This could lower their resale value.

#### 2. Tractor track width:

- (a) Increasing the track width on the truck drive axle also improves the stability, but not to the same extent as for the trailer axle.
- (b) Requiring the wide track axle on the drives would reduce flexibility and could create a shortage of logging trucks as not all operators would purchase a wide track drive axle unless they were certain that they would be hauling logs.

### 3. Box loading:

- (a) Box loading (two way loading) has two benefits. It lowers the center of gravity which improves the rollover stability and it also allows for better axle distribution without an excessive rear overhang.
- (b) Box loading is a viable option for both pulp and saw mills. Currently some mills are hauling box loads utilizing the “brow log” to assist in unloading.

### 4. Trailer bunk width of 3.05 metres

- (a) Widening the trailer bunk helps to reduce the center of gravity which has a positive influence on rollover stability. The use of wide trailer bunks is best employed together with box loading.

### 5. Increasing trailer wheelbase and interaxle spacing.

- (a) Increasing the distance between the turn centers of a logging truck improves performance. However, as this requires longer logs, not all areas of the province could achieve this higher standard.

### 6. Alternative tires on trailer.

- (a) Using alternative tires (11R22.5) lowers the center of gravity and provides a minor improvement in performance. Due to the marginal increase in benefit, it is not worthwhile to make this a mandatory specification.

### 7. Lower bunk height for jeep loggers.

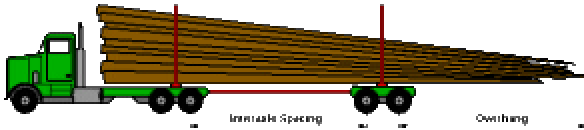
- (a) Using a goose-neck style jeep will lower the center of gravity of the load and will improve the performance of the vehicle. However, it will restrict the use of straight frame rails which allow the jeep to be pulled up onto the tractor for the return trip to the bush.

## **Recommendations**

### **1. Summary**

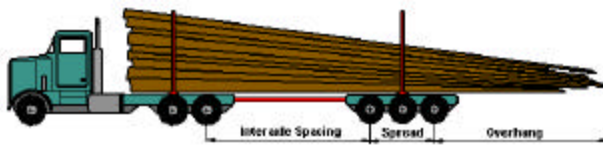
- (a) Require all logging configurations built after December 31, 2001 to have wide track axles (2.9 m or 9'-6" minimum) on the trailers in order to qualify for winter weights. Trailers built with legal width axles would still be able to haul logs at legal weights, but would not be able to haul at winter weights. Grandfather winter weights for existing logging jeeps and trailers that do not have the wide track axles for a transition period of up to 10 years. The only exception would be for 8-axle B-trains, which have a legal GVW of just 1.5 tonnes less than full winter weight.
- (b) Encourage the use of the best performing vehicles by increasing their allowable winter weights. These include the tridem drive trucks with tridem pole and hayrack style trailers. This would be effective for the 2001/2002 winter season.
- (c) Discourage the use of poorer performing vehicles such as the single axle jeep logger and quad wagons by reducing winter weights. This will occur after a transition period of three more winter seasons to allow operators to recover their purchase cost of the equipment.
- (d) These recommendations will affect only those configurations listed in section 2.

## 2. Configurations:



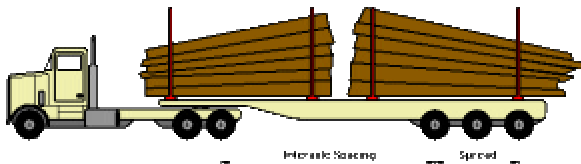
### (a) Tandem drive truck and tandem pole trailer

- Require wide track axles (2.9 metres) on the trailer.



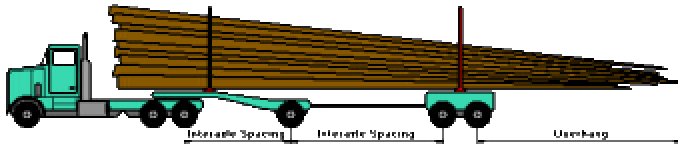
### (b) Tandem drive truck and tridem pole trailer

- Require wide track axles (2.9 metres) on the trailer.
- May need box loading to equalize axle loading.



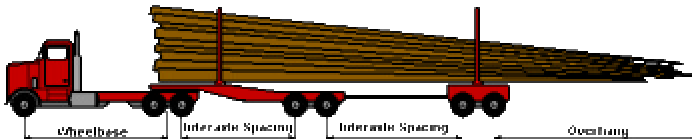
### (c) Tandem drive truck and tridem hayrack trailer

- Require wide track axles (2.9 metres) on the trailer.
- Require 3.0 metre nominal wide bunks to lower the center of gravity.



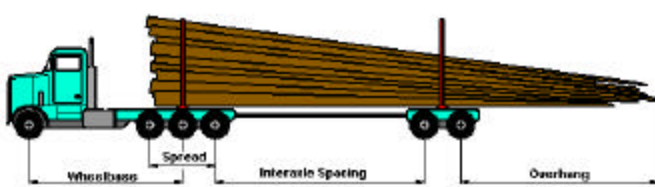
(d) Single axle jeep logger

- Require wide track axles (2.9 metres) on both the jeep and the pole trailer.
- As the minimum performance requirements are still not met, reduce the GVW to 60,000 kg. effective for the 2004/2005 winter season. This will provide for three more years of use at a GVW of 65,000 kg., but will limit the weight after that period.



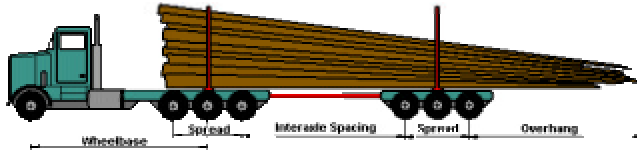
(e) Tandem axle jeep logger

- Require wide track axles (2.9 metres) on both the jeep and the pole trailer



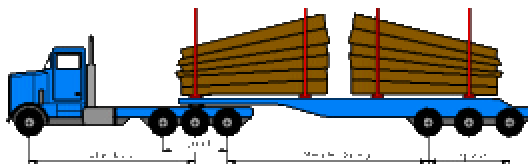
(f) Tridem drive truck and tandem pole trailer.

- Require wide track axles (2.9 metres) on the pole trailer.



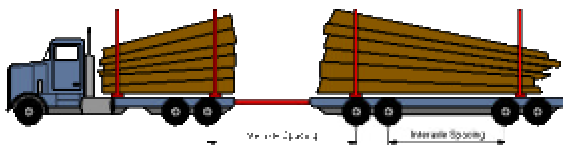
(g) Tridem drive truck and tridem pole trailer

- Require wide track axles (2.9 metres) on the pole trailer.
- Increase winter weights to:
  - 29,000 kg. on tridem drive
  - 29,000 kg. on tridem pole trailer
  - 65,000 kg. maximum GVW.
- No grandfathering of legal track width (2.6 metre) pole trailer for heavier winter weights.
- Increased winter weights on select routes only.
- Minimum 25% of drive axle weight required on steering axle.



(h) Tridem drive truck and tridem semi trailer

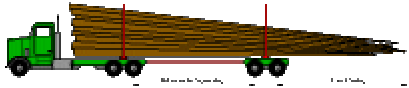

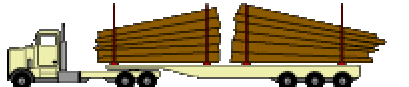




- Require wide track axles (2.9 metres) on the trailer.
- Increase winter weights to:
  - 27,000 kg. on tridem drive
  - 29,000 kg. on tridem semi trailer
  - 63,000 kg. maximum GVW., 65,000 with picker.
- No grandfathering of legal track width (2.6 metre) semi trailer for heavier winter weights.
- Increased winter weights on select routes only.
- Minimum 27% of drive axle weight required on steering axle.






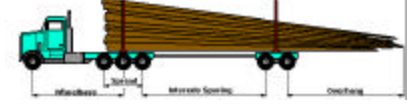


(i) Tandem drive truck and quad wagon

- Require wide track axles (2.9 metres) on the trailer.
- Either of two options:
  - Reduce GVW to 60,000 kg, and cap the weight on the full trailer to 32,000 kg. effective for the 2004/2005 winter season.
  - Use a tridem drive truck.

## Log Haul Weights – (For fall 2001, subject to transition period)


Configuration	Diagram	Summer	Winter	Summer – Picker	Winter –Picker
Tandem drive tandem pole trailer		41,300 kg	55,600 kg	41,300 kg. to 43,100 kg	55,600 kg. to 57,300 kg.
Tandem drive tridem pole trailer		48,300 kg.	57,600 kg.	48,300 kg. to 50,200 kg.	57,600 kg. to 59,300
Tandem drive tridem hayrack		46,500 kg.	57,600 kg.	48,300 kg. to 50,100 kg.	57,600 kg. to 59,300 kg.
Single axle jeep logger		48,600 kg.	60,000 kg. 65,000 during transition period.	50,400 kg. to 52,200 kg.	60,000 kg. 65,000 during transition period.
Dog logger		50,400 kg.	N/A	50,400 kg to 52,200 kg.	N/A
Tandem axle jeep logger		56,500 kg.	65,000 kg.	58,300 kg. to 60,100 kg.	65,000 kg.
Tandem axle jeep and tridem pole trailer		63,500 kg.	65,000 kg.	63,500 kg.	65,000 kg.

**Log Haul Weights** – (For fall 2001, subject to transition period)

Configuration	Diagram	Summer	Winter	Summer – Picker	Winter –Picker
B-Train		56,500 kg.	65,000 kg.	56,500 kg. to 60,100 kg.	65,000 kg.
Super B-train		63,500 kg.	65,000 kg.	63,500 kg.	65,000 kg.
B-train long logger		63,500 kg.	65,000 kg.	63,500 kg.	65,000 kg.
Tridem drive tandem pole		47,300 kg.	59,300 kg.	47,300 kg. to 49,100 kg.	59,300 kg.
Tridem drive tridem pole.		54,300 kg.	65,000 kg. *	54,300 kg. to 56,100 kg.	65,000 kg. *
Tridem drive tridem hayrack		54,300 kg.	63,000 kg. *	54,300 kg. to 56,100 kg.	65,000 kg. * **

\* 61,300 kg. if trailer axle is less than 2.9 metre track width.

\*\* Requires minimum steering axle tare weight of 8,100 kg.

Tandem drive 3 axle wagon short logs.		50,400 kg.	N/A	50,400 kg. to 52,200 kg.	N/A
Tridem drive 3 axle wagon Short logs		55,300 kg.	N/A	55,300 kg. to 57,100 kg.	N/A
Tandem drive quad wagon		55,300 kg.	60,000 kg.  65,000 kg. during transition period.	55,300 kg.	60,000 kg.  65,000 kg. during transition period.
Tridem drive quad wagon		61,300 kg.	65,000 kg.	61,300 kg. to 63,100 kg.	65,000 kg.
Tandem drive 3 axle trailer long logs.		50,400 kg.	N/A	50,400 kg. to 52,200 kg.	N/A
Tridem drive 3 axle trailer long logs		53,500 kg.	N/A	53,500 kg.	N/A