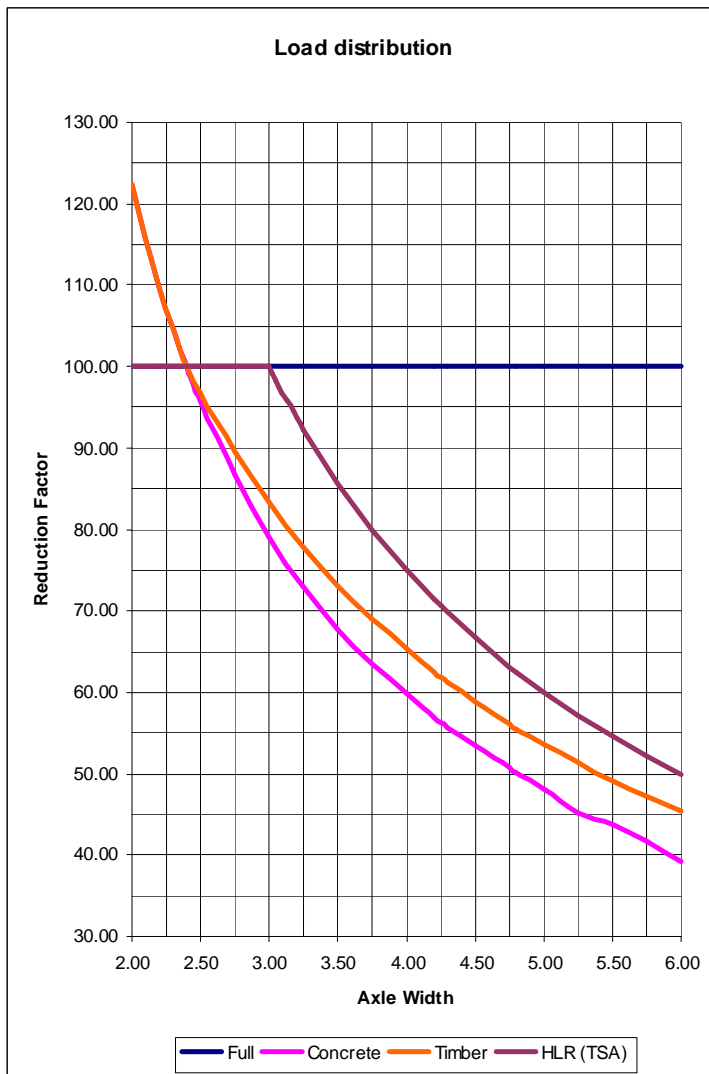


## WIDTH-MODIFIED AXLE LOADS

### Background

For some years *VicRoads* was using the PC based program *PCLegal* to compare heavy load vehicles to design load vehicles. In this regard the program was the equivalent to the DTEI - HLR Load Analysis Module.

The *PCLegal* program included an option to reduce heavy vehicle axle loads according to axle width ( $Wa$ ) and the type of structure being loaded (i.e. timber or concrete). If an option was not selected the default condition was full axle load. These axle reductions varied from the DTEI – HLR method of  $3/Wa$  (where  $Wa > 3$ ), as shown on the following graph.



The DTEI - HLR axle load reduction is more conservative than that used by *VicRoads* (by about 20%). As a consequence more *VicRoads* structures would register as overloaded when using DTEI - HLR than when manual methods incorporating *PCLegal* and inventory data were used.

The option of applying vehicle reduction factors using the DTEI - HLR methodology has proven to be less than satisfactory due to complications with varying axle widths in Heavy Load vehicles and the variation of treatments between girder and slab structures in HLR.

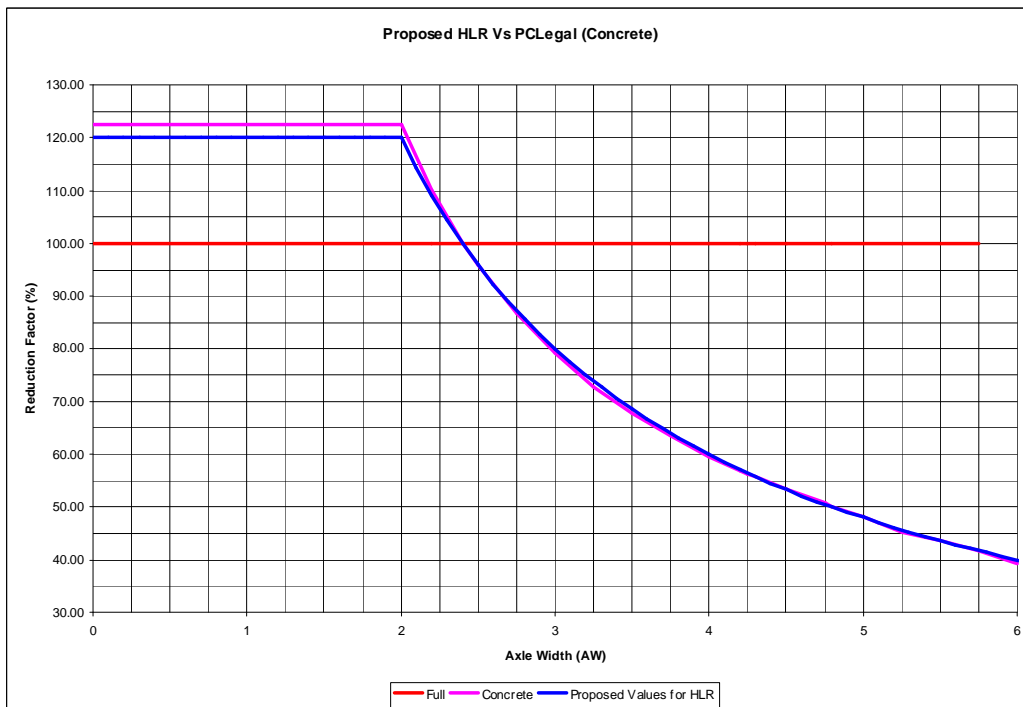
As a consequence HLR was modified in versions 4.2.06 and 5.0.4 to allow the user to select either the DTEI - HLR axle reduction factor ( $3/Wa$ ) or the VicRoads width-modified axle factors equivalent to the *PCLegal* concrete distribution.

## VicRoads Formulae

The PCLegal Concrete axle reduction can be represented in HLR by the following formulae

For  $0 < Wa < 2.0$       Factor = 1.2  
 For  $Wa \geq 2.0$         Factor =  $2.4/Wa$

The graphs below indicate that this is a reasonable approximation (note that the formulae actually increase the axle loads for widths less than 2.4 metres).



## Width-Modified Axle Loads Methodology

Let:

$WMF$  = Width Modified Factor

$Wa$  = Axle width of heavy load vehicle

$W1$  = Transition axle width where  $WMF$  changes from a constant to a variable

$C1$  = Value of constant width modified factor for axle width up to  $W1$

$C2$  = Value of constant numerator to calculate variable  $WMF$  for axle width greater than  $W1$

$WMF$  is then calculated as follows:

If  $Wa \leq W1$  then  $WMF = C1$

If  $Wa > W1$  then  $WMF = C2/Wa$

**Example:**

For DTEI	$W1 = 3m$	$C1 = 1.00$	$C2 = 3.00$
For VicRoads	$W1 = 2m$	$C1 = 1.20$	$C2 = 2.40$

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