

TECHNICAL BRIEF

Estimate of Annual Studded Tire Damage to Asphalt Pavements

January 4, 2021 Update



**Washington State
Department of Transportation**

**Construction Division -
Pavements Office**

Summary: A new estimate of the damage from studded tires to WSDOT's asphalt pavement reveals an estimated damage cost of \$8,000,000 to \$10,000,000 per year.

Studded tires damage asphalt pavements through raveling: the physical loss of aggregate from the surface of the pavement. As this loss accumulates, it primarily manifests as ruts in the pavement. When these ruts reach 0.50 inch in depth (12.5 mm) these surfaces are programmed for replacement.

The rutting due to raveling will depend on the rate of wear and the number of vehicles with studded tires driving on the road. The Oregon Department of Transportation (ODOT) has conducted studies on studded tire wear rates in 2000 and updated the estimate in 2015. The most up-to-date wear rate estimate was 0.295 inches per million passes. Several other factors must be estimated in conjunction with the wear rate to calculate a loss of asphalt surface life due to studded tires. This includes the percentage of vehicles with studded tires, the distribution of lanes these vehicles travel in and assumptions about the increased rate of raveling for top-down cracking – Washington's predominant failure mechanism for asphalt. The WSDOT Pavement Office has looked at several scenarios for these factors and concluded that an average loss of asphalt life statewide is between 0.75 and 1 years.

Using a statewide average resurfacing cost of \$250,000 per lane mile and the current average life of 14.7 years, the average annual cost per lane mile of asphalt is \$250,000 divided by 14.7, or \$17,006 per lane mile. Since there are approximately 9,040 lane miles of asphalt, the total annual cost to maintain asphalt would be \$17,006 multiplied by 9,040, which is \$154 M. At 0.75 years of increased life, or 15.45 years, this average cost is lowered to \$250,000 divided by 15.45, or \$16,181 per lane mile, which equates to \$146 M annually to maintain the asphalt system. At 15.7 years, the average cost is lowered to \$250,000 divided by 15.7, or \$15,924 per lane mile, which is approximately \$144 M annually to maintain the asphalt system. Therefore, the estimated damage cost from this decrease in life due to studded tires can be estimated at \$8 M to \$10 M annually.