NCC State Reports
Spring 2019, Lakewood, Colorado
Tire Chain Wear and Wheel Path Rutting

April 2, 2019

Disclaimer

All data presented herein is based upon the information provided in the survey and the interpretations of the information by the presenter.

33

Total Responses

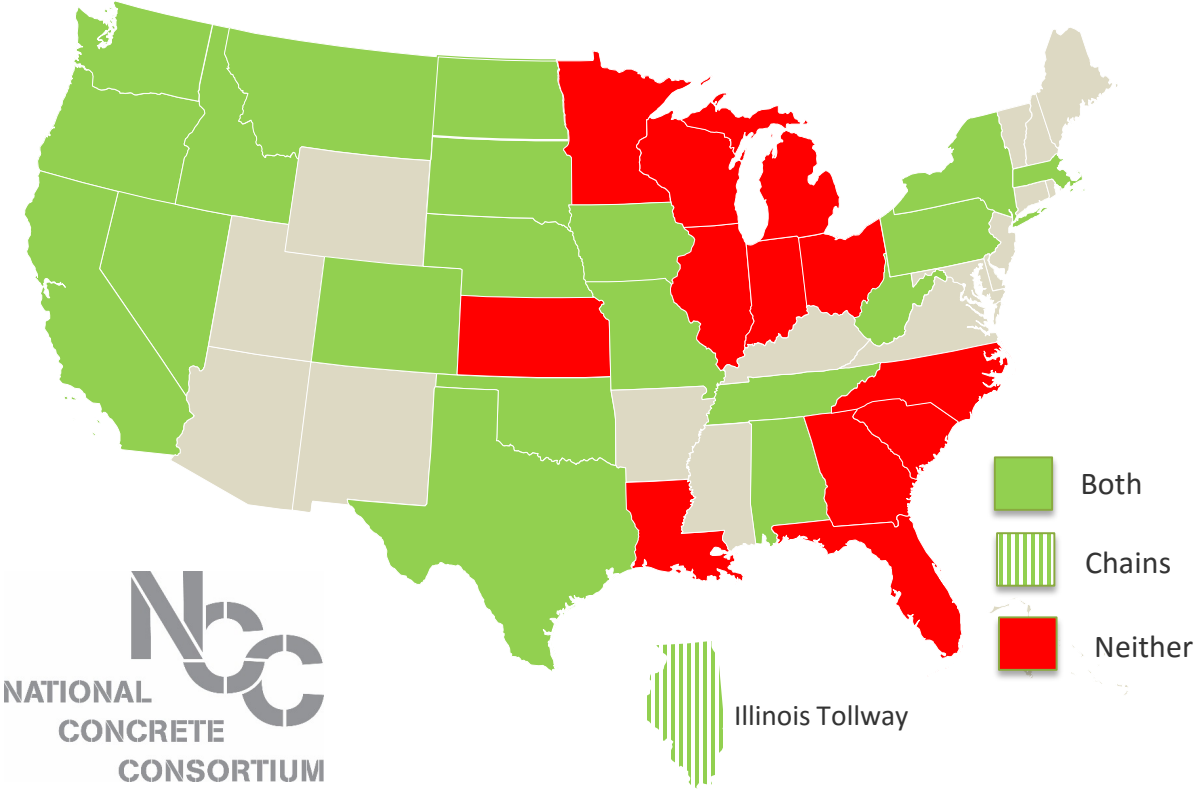
Date Created: March 15, 2019

Complete Responses: 33

Refer to the NC2 website for each DOT's response

Does your state allow studded tires, chains or other traction devices?

Answered: 33 Skipped: 0



Tyson Rupnow, LADOTD
“What are studded tires for?”

Red Mountain Pass (US 550)
Summer

Red Mountain Pass (US 550)
Winter

Red Mountain Pass (US 550)
Winter

Vail Pass (I-70)

Vail Pass (I-70)

Any restriction on traction device use? (Seasonal restrictions omitted)

AL	Farm equipment may use anytime as long as they don't injure the highway. Any other vehicle only for safety reasons. **Rarely used
IA	Studded snow tires are allowed in the state law. A 1979 research project showed issues with rutting in PCC pavements. The research recommended a ban on studded snow tires. At that time, the Iowa DOT launched an advertising campaign to reduce the use of studded snow tires. The effort must have been effective and it is rare to hear studded snow tires on pavements. The law was never changed to ban the use.
MO	Chains may not damage the highway surface.
NY	Snow chains may not damage the highway surface.
OK	Not more than 3% in the aggregate of the traction surface be composed of studs do not project more than 3/32 of an inch beyond the tread of the tire
TN	Studded tires are only permitted on vehicles less than 9000 lbs.
TX	Studs can not injure the highway
WV	Tire pressure cannot be greater than 40 psi.

Does tire chain/studded tire wear occur throughout the state or just in certain locations?

CA	Interstate 80 through the Sierra Nevada over Donner Summit sees the most wear.
CO	Mostly mountain corridors where chain use on commercial trucks is required in winter storms.
ID	Because we allow studded tires the damage occurs uniformly throughout the state. Chains are usually only used when there a sufficient amount of snow or ice on the roadway. Therefore, chains rarely come in contact with the roadway surface.
MT	Studded tire wear is throughout the state. Chains are typically used only on mountain passes.
NV	Northern Nevada and mountainous areas
WA	Studded tire use is higher where it is colder on the east side of the state and in mountain passes leading to higher wear.

Most other states answered minimal wear.

Common theme is that wear occurs mostly in mountainous areas where added traction is needed in winter driving conditions.

Is wear rate monitored?

CA	Varies annually depending on snowfall. Truck lane about 0.1 inches/year
CO	This is not monitored, but heavily travelled corridors get 1-2" HMA overlays yearly.
NV	Can be up to 1" per every 3-5 years
OR	½” wear rutting in concrete within 20 years in our more extreme use / high speed areas. Other concrete pavements in lower traffic areas, yet with studded tire use, are at about 0.4- to 0.5-inch ruts after 50 years. In general, varied by many factors, studded tire and chain wear appear to be about 3 times faster for asphalt concrete surfaces vs. Portland cement concrete surfaces.
WA	1 mm/year on east side of state and 0.5 mm/year on west side. Varies depending stud use, traffic, aggregates. Some areas have seen as much as 2 inches of wear in 15 years.

Do your concrete pavements experience wheel path rutting that is not caused by traction devices?

Pennsylvania is the only state to have other causes of rutting. They have rutting in Amish country from horse traffic.

Does your state have any design requirements for regions that experience rutting caused by traction devices?

All but one responding state do not have design requirements for wear/rutting from traction devices.

Washington DOT adds one inch to concrete pavements to allow for grinding to remove studded tire wear.

Is there a rut depth or other criteria that is used for determining when a repair or treatment is needed?

MA	Wheel ruts greater than ½ inch
MT	Wheel ruts greater than ¼ inch
OR	Wheel ruts between ½ to ¾ inch
WA	Wheel ruts greater than ½ inch

What repair methods or treatments are used for wheel path rutting? Please list.

CA	Polyester concrete wheel path inlay has been most successful. Grinding, lithium silicate hardener, bonded wearing course less successful.
CO	Diamond grinding or HMA mill/fill
MA	Mill and overlay or diamond grinding.
MT	Diamond grind, panel replacement
ND	Mini Mac, dense fine graded HMA mixture primarily used on depressed transverse cracks or rutted HMA roadways. **PCC roadways do not suffer rutting distress**.
WA	Diamond grinding
OR	Asphalt: • Wheel track inlays or blade patching as part of reactive maintenance • Pavement preservation by asphalt inlays. • Pavement preservation by asphalt inlays using a thin bonded wearing coarse (1" thick 3/8" NMAS dense mix placed with a spray paver) – 1 pilot project • Microsurfacing – 1 project, lower traffic volumes Concrete Pavement: • Asphalt overlays of 2+ inches. • Diamond grinding • Reconstruction • Bonded concrete overlays or inlays have been considered, but we haven't found the right conditions or staging options to implement yet.
PA	Overlay

Has your state performed any research into the causes of rutting or mitigation of rutting?

CA	1. Transverse profile testing of control, lithium silicate treated, and polyester inlay test sections. 2. Laboratory testing using our CT 550 surface abrasion resistance test on cores sampled from control and lithium silicate treated sections. 3. ASTM E242 Skid Resistance testing. 4. Annual and summary reports are available, but not online. Please contact David Lim (916) 227-5815; s.david.lim@dot.ca.gov
IA	http://publications.iowa.gov/16105/1/IADOT_hr148_Pavement_Wear_Stud_Tire_Use_Iowa_1979.pdf
OH	Research on causes and impacts are available on the ODOT research website. Mitigation research by others is generally known and understood.
WA	Polyester Concrete Overlay Concrete Pavement and Studded Tire Combined Aggregate Gradation as a Method for Mitigating Studded Tire Wear on PCCP Studded Tire Wear Resistance of PCC Pavements with Special Mix Designs Annual Studded Tire Damage to Concrete Pavements http://www.wsdot.wa.gov/research/reports

Has your state been approached to use nano technology (nano silica, carbon nano tubes, etc.) to mitigate rutting?

CA	Lithium silicate
CO	Carbon nano-tubes for use in PCCP.
GA	Carbon nano-tubes for use in PCCP.
OH	Been approached by nano silica and carbon nano tube folks for use in concrete, not for rutting.
OR	Not specifically for rutting. We were approached by Edencrete a couple years ago but haven't taken the step to pilot their Carbon Nanotube technology. At the time the presentation was lacking real solid evidence of increased service life in the field that would outweigh the significant cost.

States that use polyester concrete overlays on bridge decks, have you experience rutting on these overlays?

CA	Yes – not specified degree
CO	We have used polyester concrete for expansion device replacement. We have seen the polyester concrete wear away down to the expansion device. On dridge overlays, we have not seen significant wear.
NY	Polyester concrete has only recently be used in NY and we have not documented rutting in these overlays. What we have seen is the broadcasted aggregate wearing off and polishing in the wheel paths.

States with bare concrete bridge decks that experience PCCP rutting, do the bare concrete decks experience the same degree of rutting?

Three of the responding states said they have the same rate of wear on bridges as PCC.

Seventeen said wear rate was different, but with no explanation

Additional Comments

OR	One of the few materials that held up extremely well to studded tire wear was an “epoxy asphalt” material that was paved on a bridge deck using traditional asphalt paving methods.

Questions?