

HB

301

DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES

ENGINEERING & OPERATIONS STANDARDS

3132 CHANNEL DRIVE
UNEAU, ALASKA 99501-7538
PHONE: (907) 465-2951
TEXT TELEPHONE: (907) 465-3652
FAX: (907) 465-2460

August 3, 1993

Representative Mark Hanley
716 West 4th Avenue
Anchorage, Alaska 99501

Subject: Studded Tires
& Stud Types

Attn: Kip Knutson

File: 2552

AUG 09 1993

Dear Mr. Knutson:

I am responding to your call and our discussion on July 21st regarding the advisability of requiring a tire stud type with a hardness of 6.5 on the Moh hardness scale. You should be aware that the Moh scale is intended only for scratch hardnesses of crystals of minerals and not for metals. As such, it was constructed by determining what mineral would scratch other minerals. I understand that typical steels range from about 5.5 to 6.5. However, tire studs require a carbide center pin which is probably around 7 or 8 on the Moh scale. Studs of only steel would wear quickly and not work as ice gripping studs at all; I doubt that any such are even manufactured. The alternative I suggest for reducing pavement wear is the use of lightweight studs, as are now being required in Northern Europe. Mr. Bo Simonson of Sweden's Road and Traffic Research Institute advised that use of aluminum or plastic bodied studs will be expected to cut pavement wear rates in half. Samples of lightweight European type studs are enclosed, along with typical steel studs from a local tire shop. Legislation requiring such lightweight studs would require that the maximum stud weight be set at 1.3 grams for cars and at about 2.0 grams for large trucks (tire rim sizes of 17" or greater).

As we discussed, our pavement rut measurements from start to end of the winter seasons have shown a pavement wear rate of 0.1 to 0.2 inches per million studded tire passes. The direct value of the pavement worn away amounts to \$10 to \$15 per studded tire during it's useful life. However, repairing the ruts normally requires that we mill or remove and replace the pavement across the entire lane to the bottom of the ruts. This increases the pavement repair costs to about \$40 to \$50 per studded tire. These costs may substantially reduced by lightweight studs.

August 3, 1993

The best wear data we have from pavement rut measurements is from Juneau. It is summarized by my memo of 6/13/91 (copy enclosed). However, in the Anchorage area good data comes from our pavement study site on the Glenn Highway just north of Eagle River. At that location the maximum rut depth is now about 0.9" after 10 years of service. The wear rate has been about 0.10" per million studded tire passes and the pavement loss from wear has been 19 tons per lane per mile per million passes.

As a final comment, the few studded tire use counts we made this past winter indicated large increases in studded tire use over the 1990 levels, which is disturbing from a pavement life standpoint. Juneau studded tire usage levels in March were 35% higher than in 1990, while Anchorage usage was up by 55%.

I hope that these figures will be of help to you. Also, we are just initiating a study of the comparative wear resistance of our different paving mix types. Within the next few months we hope to have some additional information from the wear testing machine being developed under that study. If you need further information on our rutting research work, please call me at 465-6956.

Sincerely,



David Esch
Research Applications Engineer

Enclosures

cc: R. D. Shumway, Chief Engineer
Eric Johnson, Pavement Management Engineer, Stwd. Materials



Representative Mark Hanley
Alaska State Legislature

MEMORANDUM

DATE: April 18, 1994

TO: Senator Bert Sharp
Chairman, Senate Transportation Committee

FROM: Representative Mark Hanley *MH*

SUBJECT: Scheduling of CSSSHB 301 (L&C) "Sale of lightweight studs"

CSSSHB 301 (L&C) would require the sale of lightweight studs in Alaska starting in 1997. Use of lightweight studs could reduce pavement wear by 50% without compromising the performance benefits of studded tires. This is a "win-win" situation.

Studded tires have a negative side effect on our roads in the form of increased pavement wear, which compromises safety and increases the need for road maintenance. Studs currently used in Alaska cause between \$133 and \$266 in pavement damage per vehicle, per 40,000 miles of travel. Grooves worn in pavement create the potential for vehicle loss of control, especially during wet or icy conditions.

The direct value of the pavement worn away amounts from \$10 to \$15 per studded tire. Repairing ruts normally requires that the pavement across the lane from the ruts be extracted. This increases the repair costs to about \$40 to \$50 per studded tire.

Lightweight studs are now being used in Northern Europe and are expected to cut pavement wear rates in half. The lightweight studs compare favorably in performance tests against standard studs and consist of tungsten steel tips seated in aluminum or plastic bodies. I believe Alaska should move in this direction.

Your prompt attention to this matter would be greatly appreciated.



HIGHWAY USERS FEDERATION OF ALASKA

1506 W. 36TH AVE., ANCHORAGE, AK 99503

April 25, 1994

Senator Bert Sharp
Chairperson Senate Transportation Committee
State Senate
State Capitol, Room 514
Juneau, Alaska 99801-1182

Dear Senator Sharp:

Please read this letter into your committee records on April 26, 1994 at 3:30 p.m. or thereabouts.

Highly developed Tungsten carbide studded tires are destroying Alaskan roads at an alarming rate, probably over \$5 million per year. One road in Anchorage, paved two years ago, now has ruts nearly two inches deep.

Today, I was thrown violently from side to side after crossing a particularly deep rut on Minnesota. I can imagine the negligence claims against the state should a fatal accident be tied to such ruts.

House Bill 301 is not an effective solution to the problem, but instead apparently caters to one group that stands to profit.

Lightweight studs are just a ploy with small significant benefit in road wear reduction. Use of newer tire technology or soft studs offer much better possibilities and will provide nearly the same benefits as the highly abrasive Tungsten carbide studs.

Please amend House Bill 301 to address stud hardness or other possibilities. ADOT&PF has thoroughly researched and tested this problem and has isolated the correct solutions. Please use their expertise in technical matters such as this.

Sincerely,

HIGHWAY USERS FEDERATION OF ALASKA


Dennis Northingham, P.E.
Secretary/Treasurer

cc: Commissioner Bruce Campbell

Alaska State Legislature

SENATOR
BERT SHARP
CHAIRMAN



Senate Transportation Committee

FAIRBANKS

DENALI BANK BUILDING
110 N. CUSHMAN, SUITE 201
FAIRBANKS, ALASKA 99701
(907) 452-7885/7886

SESSION ADDRESS

STATE CAPITOL, ROOM 514
JUNEAU, ALASKA 99801-1182
(907) 465-3004/4921

MEMORANDUM

DATE: April 26, 1994

TO: Senate Transportation Committee Members

FROM: Senator Bert Sharp, Chairman
Senate Transportation Committee

RE: Work Draft CS for HB 301

The following changes have been included in the work draft at the request of the Department of Transportation and Public Facilities:

1. The word "**diameter**" was added to lines 8 and 10 to clarify the measurement standard.
2. Studs have been further defined as not having a "**hardness greater than 64 on the Rockwell C scale of hardness in any part of the stud being sold or used.**" This has the effect of requiring a softer stud than the bill currently allows.
3. The effective date has been changed from 1997 to 1996.

MEMORANDUM


State of Alaska
Department of Transportation & Public Facilities

TO: Jeffery C. Ottesen
Director, E&O Standards
Headquarters

DATE: June 13, 1991

FILE NO: 64217

TELEPHONE NO: 474-2471

FROM: David C. Esch, P.E. 
Senior Research Engineer
Statewide Research

SUBJECT: Studded Tires

A copy of the attached letter from Commissioner Turpin to Legislator Curt Menard on the subjects of studded tires use and pavement wear has come to my attention, and some new data I have just processed may be of interest.

Studded tire use and roadway rutting in Alaska have been the subject of a research study now nearing completion. I have processed Juneau pavement wear data at the Juneau Douglas bridge, the Douglas Island "Breeze-In" crosswalk, and the Mendenhall Loop pedestrian over-crossing. Pavement wear rates were calculated based on total studded tire passes estimated from stud usage counts and monthly and annual traffic counts. Results were very consistent between sites, as shown in Table I.

Total Stud Passes by 4/4/91 (Millions)	Location	Wear per Million Passes		
		Wear Rate (inches)	Wear Area (inches) ²	Tons/Lane/Mi.
5.37	On J.D. Bridge	0.148	9.31	23.9
5.37	Before J.D. Bridge	0.134	9.92	25.5
3.87	Douglas Road	0.122	9.08	23.3
5.84	Mendenhall Loop	0.102	7.56	19.3

The 4th column, showing the worn area in square inches is the cross-sectional area worn away in both ruts of one lane at our measurement sites. These results show our wear rates to be much less than quoted in previous literature. These figures convert to pavement losses of 10 to 14 metric tons per kilometer, rather than the 50 to 100 tons quoted in the letter to Representative Menard. This, in turn, converts to a cost for replacement of the worn away pavement of about \$12.00 per studded tire if the tires are used for 30,000 miles. A suitable solution may be to tax studded tires at \$12.00 each at the point of sale.

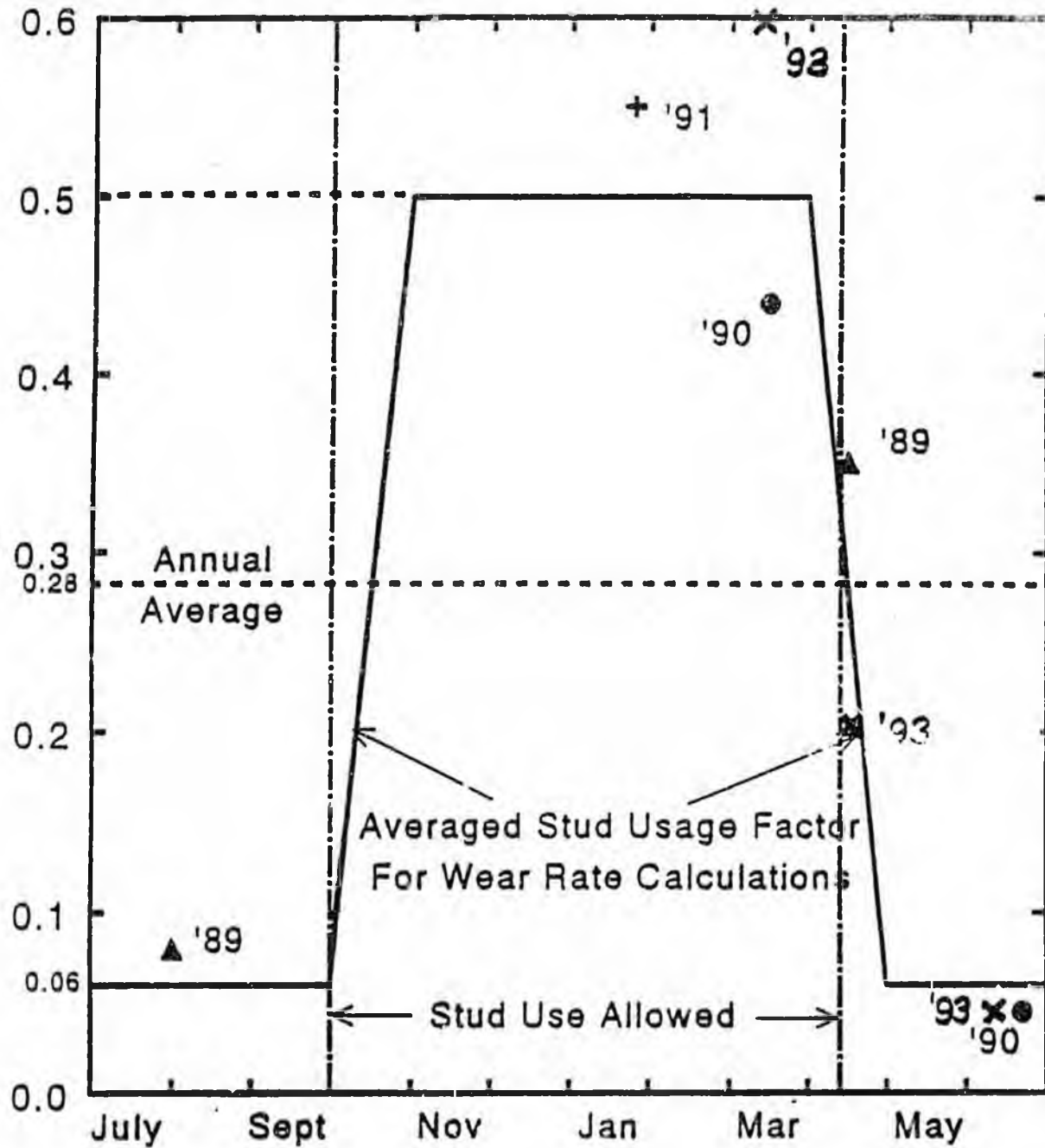
Our Juneau rut data has provided some very interesting conclusions. By measuring rut depths on and off of the Juneau-Douglas Bridge we found essentially the same rut depths developing over the bridge deck concrete as over a crushed gravel subgrade. The approaches and the bridge itself were paved with the same AC mix. This tells us that subgrade deformation is not a cause of the pavement rutting, and that our interpretation of the rutting as wear-related is correct.

Our measurements before and after the 1990-91 winter tell us that rut depths increase much more rapidly in winter than in summer, due to the much higher wintertime usage of studded tires and also to some spinning of the tires when roads are icy. Table II summarizes our measured wear rates over various time periods.

TABLE II: Juneau Area - Seasonal Rut & Wear Measurements				
Site	Period Covered	Dates Covered	Wear Rates inches/million Stud Tire Passes	
S. Douglas	8 Summers + 7 Winters	10/81 to 4/89	.112	
	2 Summers + 1 Winter	4/89 to 10/90	.099	
	1 Winter	11/90 to 4/91	.265	
Mendenhall Loop	7 Summers + 6 Winters	9/82 to 4/89	.105	
	2 Summers + 1 Winter	4/89 to 10/90	.094	
	1 Winter	11/90 to 4/91	.090	
J. Douglas Bridge	8 Summers + 7 Winters 2 Summers + 1 Winter 1 Winter	10/81 to 4/89	<u>On Bridge</u> .145	<u>Off Bridge</u> .133
		4/89 to 10/90	.127	.150
		11/90 to 4/91	.202	.115
Juneau Average Values	8 Summers + 7 Winters 2 Summers + 1 Winter 1 Winter	Up to 4/89	0.124	
		4/89 to 10/90	0.118	
		11/90 to 4/91	0.168	

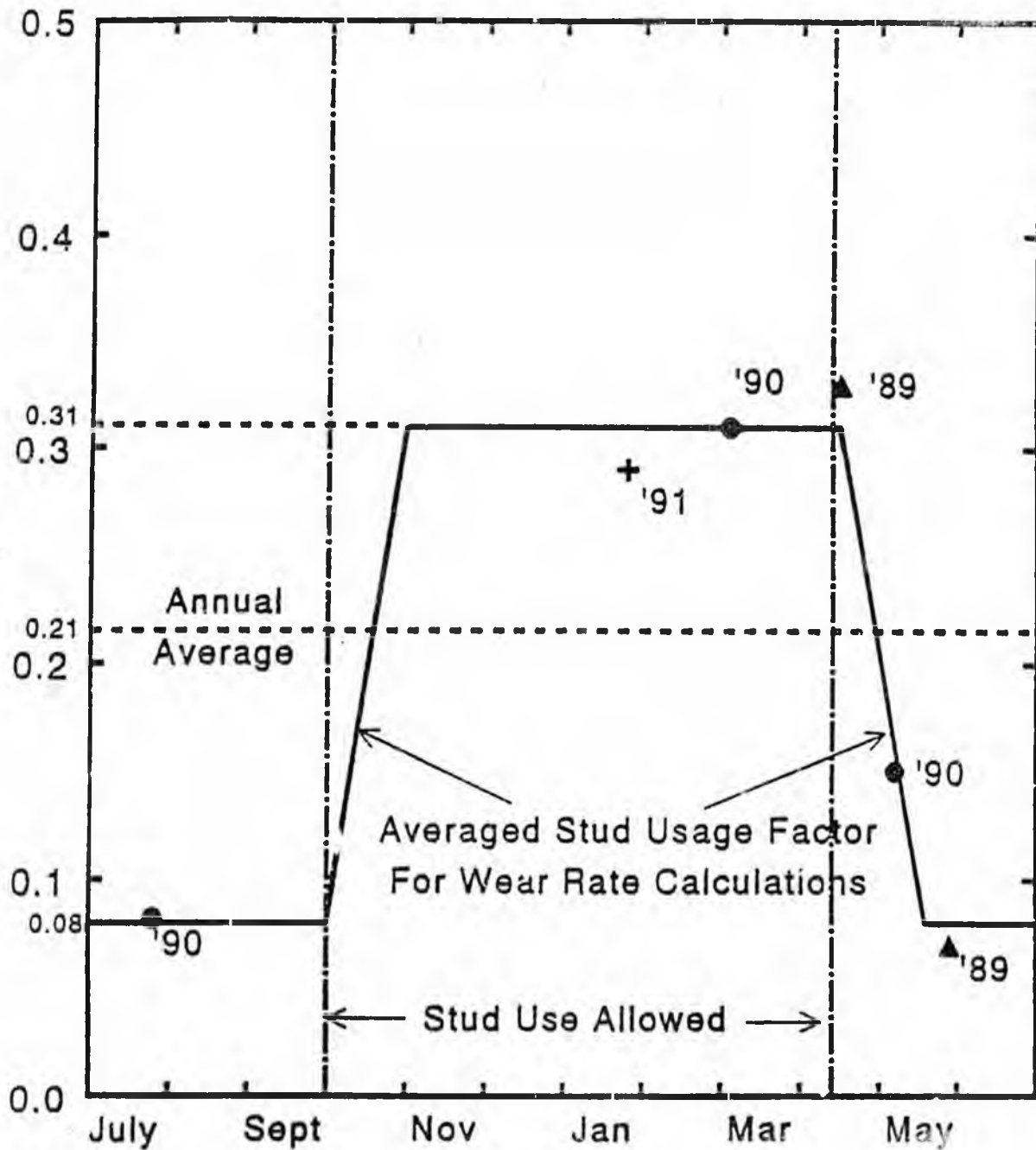
My overall conclusion is that essentially all of the pavement rutting in Juneau is due to studded tire wear, and that about 10% of the total rutting comes from stud use during the "No-studs-allowed" season of the year. The higher winter time wear rates for the first and third sections listed may be because they are in light acceleration or braking areas, while the Mendenhall Loop site has a more constant speed aspect.

Studded Tires per Vehicle Pass
(one wheelpath)



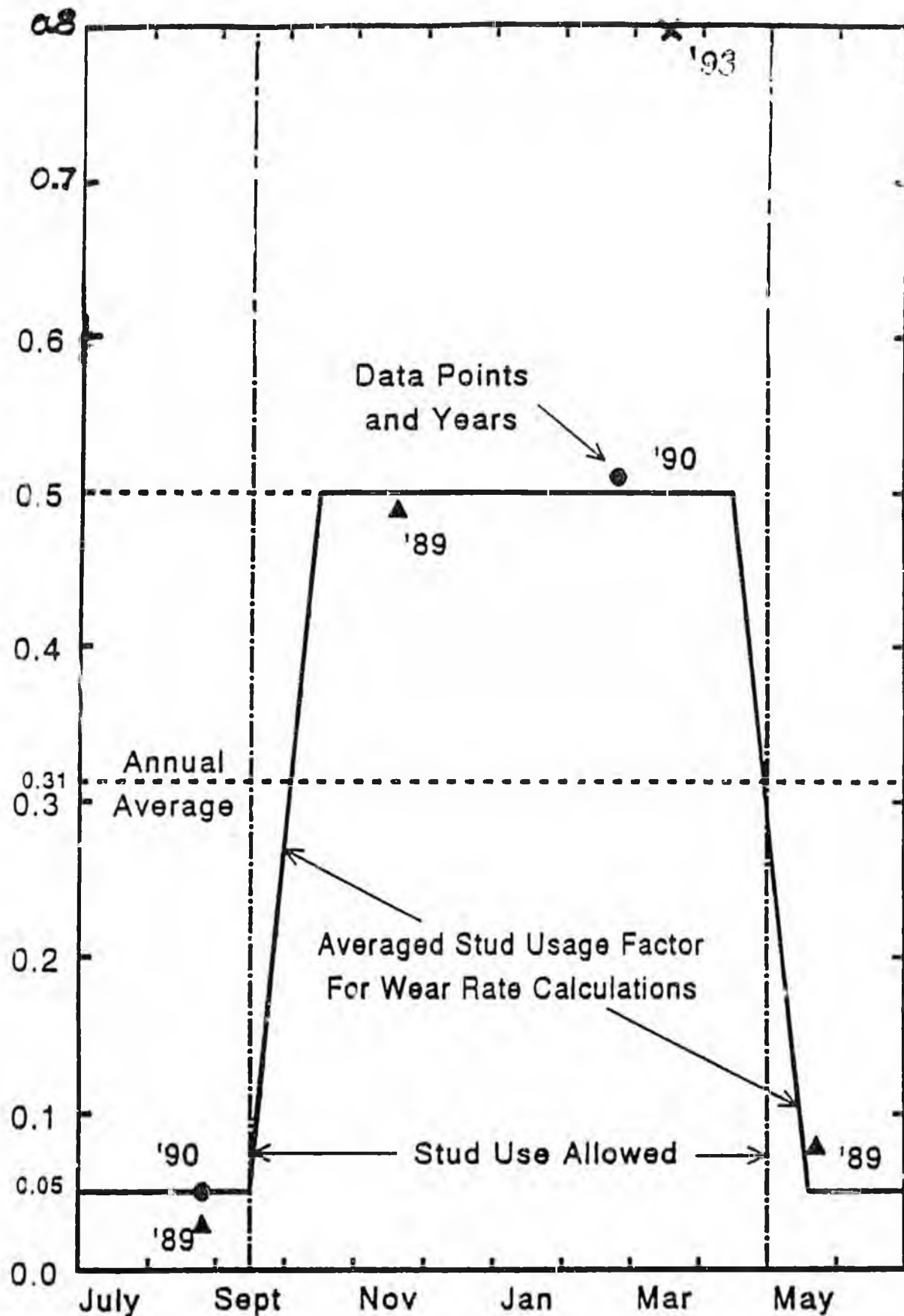
Seasonal Studded Tire Frequency Pattern
Juneau, Alaska

Studded Tires per Vehicle Pass
(one wheelpath)



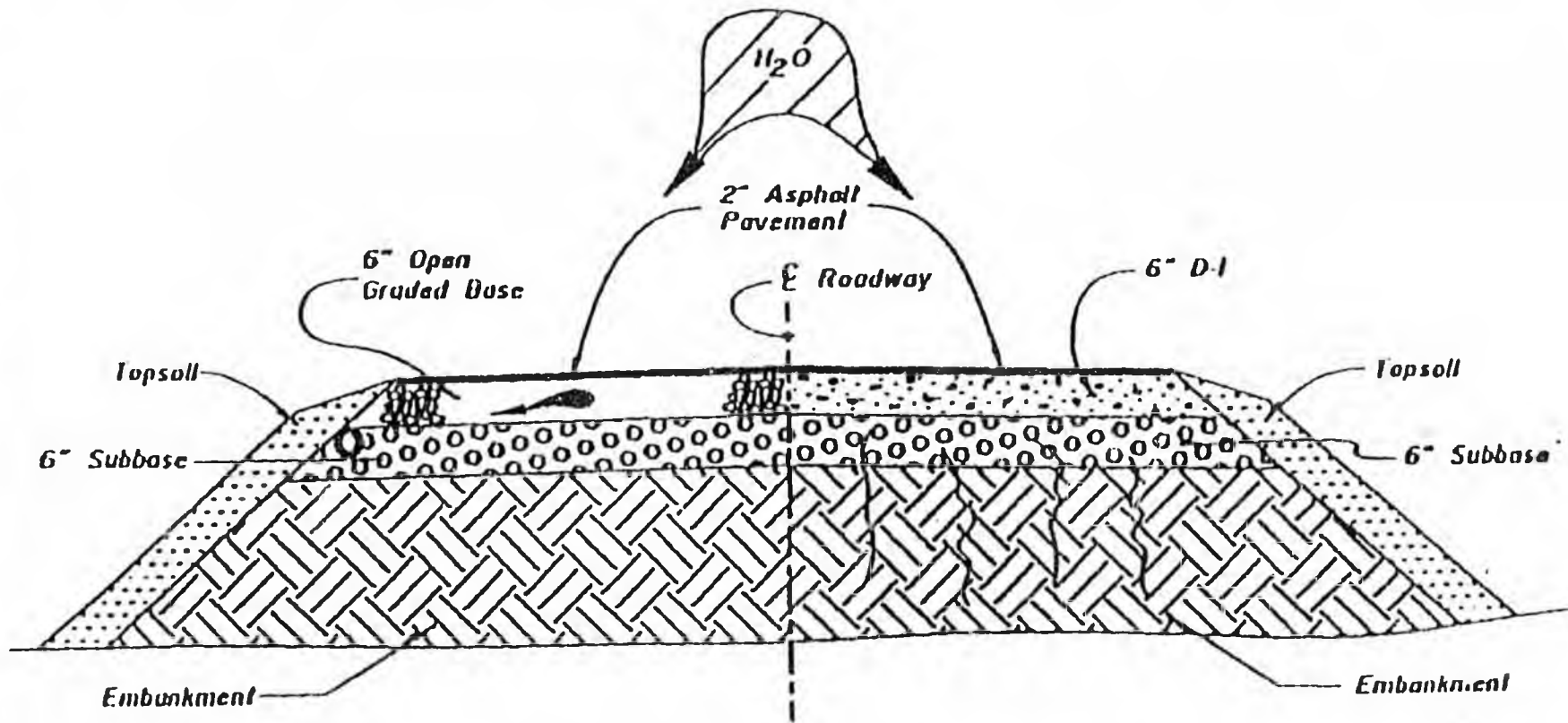
Seasonal Studded Tire Frequency Pattern
Fairbanks, Alaska

Studded Tires per Vehicle Pass
(one wheelpath)



Seasonal Studded Tire Frequency Pattern
Anchorage, Alaska

Alaska Department of Transportation & Public Facilities



OPEN GRADED BASE

Sieve Designation	Percent Passing* by Weight
5"	100
3/4"	75-100
1/2"	50-70
3/8"	35-60
No. 4	0-0
No. 8	
No. 40	
No. 100	

* 2-3% Asphalt

TYPICAL CROSS-SECTION

D-1

Sieve Designation	Percent Passing by Weight
5"	100
3/4"	70-100
3/8"	50-80
No. 4	35-60
No. 8	20-50
No. 40	5-30
No. 200	0-8

Studded Tire

Estimate of the Pavement Damage of A Set of 4 Studded Tires

Weight of Lost Asphalt Concrete* (metric tons)	Distance traveled (kilometers)	US Tons lost per 1,000 Miles	Cost per Ton Asphalt Concrete (US tons)	Allied Costs**: Assume 50% of AC Cost	Cost per 1,000 Miles of Stud Tire Use	Cost for Life of Set of Studded Tires (4)***
50	1,000,000	0.09	\$35.00	\$17.50	\$4.66	\$186
100	1,000,000	0.18	\$35.00	\$17.50	\$9.31	\$373

* From a paper presented at the XIVth World Road Congress, Prague, Czechoslovakia, 1971, based on research in Sweden.

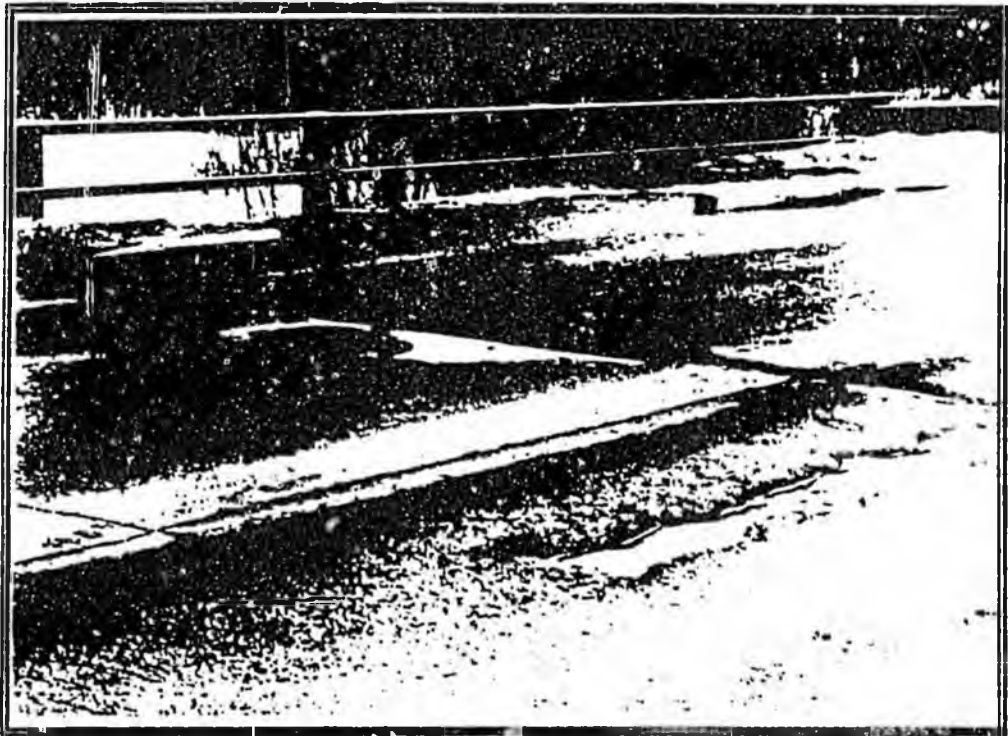
** Allied costs include engineering, mobilization and demobilization, and preparation.

** A set of tires is assumed to have a 40,000 mile life.

Prepared by Engineering and Operations Standards Division, Alaska DOT&PF, April, 1991



Studs have worn through the top pavement layer ($2'' \pm$) along lines spaced equally with car wheels.



Pavement ($2'' \pm$) on bridge has been stud worn to concrete.

Washington lawmakers seek a \$25-per-tire fee on studs

By JOSEPH TURNER
McClatchy News Service

TACOMA, Wash. — State lawmakers have tried to outlaw road-damaging studded tires for most of the past 20 years, and they came close a few years ago.

But on the day the ban came up for a vote in the state House, fate intervened. It snowed.

And as supporters of the ban drove down the freeway from Seattle to the state capital in Olympia — slipping and sliding along the way — they started changing their minds.

"The gods were trying to tell us something," said George Walk, who sponsored the bill as chairman of the House Transportation Committee in the late 1980s. "It was going to be a close vote anyway. So when it started snowing outside, we were ready to give up."

Walk let the bill die without a vote.

This year lawmakers are taking a different tack. Instead of trying to ban studded tires, they want to impose a tax of \$25 per tire.

Senate Transportation Committee members approved the special stud tax in Senate Bill 5151 last week; the full Senate is expected to vote on the bill this week.

"We might not have to raise the gas tax so much if we'd do something about studded tires," said Rep. Shirley Winsley, R-Fircrest, this year's bill sponsor. "If people are going to insist on using studded tires, they should be willing to pay a small fee."

Small fee?

"Oh, jeez," said Richard Nordness, director of the Washington State Tire Dealers Association. "People can't afford to put that much money into tires

NORTHWEST

"A good snow tire costs \$50 to \$60. Most dealers charge \$9 or \$10, plus labor, to put the studs on. With a \$25 tax ... you're talking pretty close to \$100.

"It's insane, really," he said. "Putting such a high tariff on them has the same effect as a ban."

That's the point, said Sen. Larry Vognild, chairman of the Senate Transportation Committee.

Highway officials estimate studded tires cause about \$25 million damage a year to the highway system. The studs gouge into asphalt and concrete roadways. Pavement supposed to last 14 years gets chewed up years earlier.

Historically, the studded tire debate has pitted Western Washington lawmakers against their Eastern Washington counterparts. It's a question of differing climates.

In the slushy snows west of the Cascades, a studded tire is no help. And on wet

or dry pavement, studs can radically reduce traction, said Ron Maulsby, public affairs manager for Goodyear Tire and Rubber Co. in Akron, Ohio.

"The only time we recommend a studded tire is where you're in part of the country where ice is covering the road for days or for months at a time," Maulsby said. "Metal studded tires will provide 40 percent better traction on compact snow and ice."

Nordness disputes the amount of damage caused by studded tires, especially since they've been equipped with a softer metal stud.

"It has not been proven that studded tires do that much damage to the road," he said. "Those same kinds of ruts show up in Florida and other states where studs are outlawed."

Heavy trucks get some of the blame for rutted highways.

"If we have to go back to the old days of using chains, we're going to see a lot more damage," Nordness said.

NOTICE



The first clinic of the Alaska Baseball Umpires Association is scheduled for Tuesday, March 16th at 7:00 p.m. at Ptarmigan Elementary School, 888 Edwards Street.

TRAINING BEGINS FOR NEW UMPIRES.

For more information call Allen Smith,
344-0933 or 243-7757.

STATE OF ALABAMA
1994 LEGISLATIVE SESSION

FISCAL NOTE

Revision Date: _____ Department Affected: **DOT&PF**
 Title: **Ban Sale of Some Studded Tires and Studs** BRU:
 Sponsor: **Hanley** Component:
 Requestor: _____ Component Serial Number: _____

EXPENDITURES/REVENUES: (Thousands of Dollars)

OPERATING	FY95	FY96	FY97	FY98	FY99	FY00
PERSONAL SERVICES	0	0	0	0	0	0
TRAVEL	0	0	0	0	0	0
CONTRACTUAL	0	0	0	<1,000.0>	<2,000.0>	<2,000.0>
SUPPLIES	0	0	0	0	0	0
EQUIPMENT	0	0	0	0	0	0
LAND & STRUCTURES	0	0	0	0	0	0
GRANTS, CLAIMS	0	0	0	0	0	0
MISCELLANEOUS	0	0	0	0	0	0
TOTAL OPERATING:	0	0	0	<1,000.0>	<2,000.0>	<2,000.0>
CAPITAL	0	0	0	0	0	0
REVENUE FUND SOURCE	0	0	0	0	0	0

FUNDING: (Thousands of Dollars)

1002 FEDERAL RECEIPTS	0	0	0	<900.0>	<1,800.0>	<1,800.0>
1003 GF MATCH	0	0	0	<100.0>	<200.0>	<200.0>
1004 GF	0	0	0	0	0	0
1005 GF/PROGRAM RECEIPTS	0	0	0	0	0	0
1006 GF/MHTIA	0	0	0	0	0	0
OTHER	0	0	0	0	0	0
TOTAL FUNDING:	0	0	0	<1,000.0>	<2,000.0>	<2,000.0>

POSITIONS

FULL-TIME	0	0	0	0	0	0
PART-TIME	0	0	0	0	0	0
TEMPORARY	0	0	0	0	0	0

Estimate of current year (FY94) impact: 0

ANALYSIS: (Attach a separate page if necessary)

DOT&PF estimates that stud wear of highway pavements creates annual pavement replacement or repair costs of approximately \$4,000,000. While not providing additional funding to DOT&PF, the bill will allow better use of existing Federal Aid Highway funds, by reducing rut repair costs by 50% annually once the bill is in effect.

Prepared by: Schuyler J. Stevens, P.E.

Phone: 465-6977

Division: Chief State Engineer

Date: April 8, 1994

Approved by Commissioner: 

Phone: 465-3901

B.A. Campbell

Agency: Department of Transportation and Public Facilities

Date: April 11, 1994

PREPARER TO PROVIDE ALL DISTRIBUTION COPIES TO GOVERNOR'S LEGISLATIVE OFFICE
 For further distribution information, contact the Legislative Office

8-LS11020 ✓
Ford
4/26/94

SENATE CS FOR CS FOR SS FOR HOUSE BILL NO. 301(TRA)
IN THE LEGISLATURE OF THE STATE OF ALASKA
EIGHTEENTH LEGISLATURE - SECOND SESSION

BY THE SENATE TRANSPORTATION COMMITTEE

Offered:
Referred:

Sponsor(s): REPRESENTATIVES HANLEY, Finkelstein, Navarre

A BILL

FOR AN ACT ENTITLED

1 "An Act prohibiting the sale of certain studded tires or the sale of certain studs
2 to be installed in tires; and providing for an effective date."

3 BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

4 * Section 1. AS 28.35.155 is amended by adding a new subsection to read:

5 (c) A person may not sell a studded tire or sell a stud for installation in a tire
6 if the sale is conducted as a part of the person's business and the stud being sold or
7 a stud used in the studded tire has a (1) weight greater than (A) 1.3 grams if the stud
8 is sold for use or is used with a tire that has a tire rim diameter smaller than 17
9 inches; or (B) 2.0 grams if the stud is sold for use or is used with a tire that has a tire
10 rim diameter equal to or greater than 17 inches; or (2) hardness greater than 64 on the
11 Rockwell C scale of hardness in any part of the stud being sold or used. In this
12 subsection, "business" has the meaning given in AS 43.70.110.

13 * Sec. 2. This Act takes effect July 1, 1996.