THE STATE of ALASKA
GOVERNOR BILL WALKER

Department of Transportation and Public Facilities

OFFICE OF THE COMMISSIONER
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The Honorable Bert Stedman
Alaska State Senate
State Capitol Building, Room 30
Juneau, Alaska 99801

Dear Senator Stedman:

Thank you for the opportunity to present information relative to Senate Bill 50 during the February 23, 2017, meeting of the Senate Transportation Committee. In response to questions posed by committee members, the following information is provided:

- ***Page 5 of the DOT&PF presentation depicts a 2008 picture of road damage on Eagle River Loop Road. When was that asphalt laid, and what was the mix design of that asphalt?***

  This hot-mix asphalt, a Type II-Class A asphalt, was laid in 1993. (See mix design enclosed).

- ***On what date did DOT&PF implement its hard aggregate policy?***

  The department's August 2, 2013, memo can be seen at: http://www.dot.state.ak.us/stwddes/dcspubs/assets/pdf/directives/081413_hard_aggregate_policy.pdf

- ***Is it cheaper to use hard aggregate that is sourced from the state of Washington versus hard aggregate that comes from Cantwell, Alaska?***

  It should be mentioned first that, for a given paving project, the department does not specify or stipulate the use of specific hard aggregate material sources. The department only specifies the quality of the aggregate to be used, i.e., the hardness of the aggregate as measured by the Nordic Abrasion test-ATM 312. It is up to the contractor or producer of the asphalt mix to acquire the aggregate from a source that meets the department's aggregate hardness requirement. Accordingly, we have seen that contractors paving projects in southeastern Alaska and surrounding coastal areas (including Kodiak Island) have barged their hard aggregate from Washington State and British Columbia sources; whereas contractors paving projects in southcentral have used hard aggregates that were delivered by rail from Cantwell, Alaska.

- ***What percentages of Alaskan vehicles are operating with studded tires?***

The department is aware of estimates that range between 12% and 20%, but is currently unable to substantiate any percentage. The department is currently involved with the University of Alaska in a research project that is intended to provide us with more accurate information.

- ***Excluding studded tires, what are other causes of wear and tear on roads?***

Other causes of wear and tear on roads are environmental affects and normal vehicular traffic.

Asphalt pavements are prone to three main distresses:

- Low-temperature cracking, in the form of transverse cracks perpendicular to the pavement's centerline, primarily due to the shrinkage of the asphalt layer due to low temperatures.
- Fatigue cracking, caused by fatigue failure of the asphalt layer under repeated traffic loading, initially starts as longitudinal cracks in the wheel path then, in its advanced stages, evolves into a series of interconnected cracks forming a pattern resembling the back of an alligator.
- Rutting is surface depression within the wheel path areas, parallel to the centerline, caused by repeated wheel loads.

There are two types of asphalt surface rutting:

- During hot summer months, traffic loading may cause wheel path depression in the form of plastic deformation in the asphalt surface layer, causing consolidation and lateral movement of the asphalt material, in addition to uplifting (shearing) along the sides of the rut. The main feature of this type of rutting is the continuous longitudinal bulge or ridge that forms at the edges of the rut.
- Material removal from the pavement surface through studded tires' abrasive wear is seen as depression or indentation in the wheel path, accompanied by discoloration of the wheel path relative to its surrounding pavement (due to aggregate abrasion and polishing), and the absence of a bulge or ridge at the edges of the rut. (The enclosed slide is a comparison between the two types of surface rutting; refer to the notes under the slide).

- ***Would the increased revenue generated by increased studded tire fees result in more service from DOT&PF?***

As currently drafted, Senate Bill 50 does not guarantee an increase of operating budget funds to the department. The proposed language provides that revenues from studded tire fees are separately accounted for as program receipts by the Department of Administration under AS 37.05.142. The proposed language gives the Legislature the *ability* to directly appropriate revenues generated by the bill to the repair and maintenance of roads maintained by the state.

- ***What is the cost-effectiveness of using hard aggregate?***

While the cost of using hard aggregate material is generally greater than the cost of using a local aggregate source, the department believes the life cycle cost analysis and improvement in pavement performance reflects a financial benefit of hard aggregate use in the long run.

Examples of this positive return on investment have recently been seen on pavement resurfacing projects on Egan Drive in Juneau and on Tudor Road in Anchorage.

Results from the studies referenced below indicate that the economy of hard aggregate materials use supports the transportation costs for importation of these aggregates to regions of the state that do not offer them.

- Cost-Effective Rut Repair Methods shows life cycle cost analyses performed for various rut repair methods, including the use of hard aggregate in mixes. (See Section 2.3 of the report.) http://www.dot.state.ak.us/stwddes/research/assets/pdf/fhwa_ak_rd_01_04.pdf

- Cost-Effectiveness of Hard Aggregate Sources: Alaska Hard Aggregate Performance Study http://www.dot.state.ak.us/stwddes/research/assets/pdf/fhwa_ak_rd_02_10.pdf

- Cantwell Hard Aggregate Development Feasibility study http://www.dot.state.ak.us/stwddes/desmaterials/assets/pdf/hard_ashpalt_aggregate_study/6_final_cantwell_development_study.pdf

➢ ***Where can we find more hard aggregate material sources?***

Hard aggregate material sources are identified and profiled in a 2013 R&M Consultants report at: http://www.dot.state.ak.us/stwddes/desmaterials/assets/pdf/hard_ashpalt_aggregate_study/final_report_hard_aggregate_study_4.pdf

➢ ***Is it true that there is a hard aggregate material source in/near Juneau?***

While last year's Egan Drive resurfacing project used hard aggregate sourced from Dupont, Washington, a hard aggregate source from Haines was used to pave Egan Drive in 2000.

The department is aware of three sources of hard aggregate in the Haines area, but the current state of these sites is unknown at present time:

- Haines Hwy: Mile 4.5 site;
- Haines Hwy: Mile 5.5 site; and
- Mile 25 Klehini site

It should be mentioned that the presence or discovery of a hard aggregate material source does not make the source readily available for paving project use. Significant investment should be made and major development efforts should be carried out to produce sufficient material quantities for projects in that area.

➢ ***For past projects, has DOT&PF been able to transport hard aggregate via rail (to projects in the Mat-Su Valley or elsewhere)?***

The department does not transport the aggregate; the contractor does that work. When hard aggregate was specified, the Anchorage bowl and Mat-Su Valley paving projects used hard aggregate sourced from Cantwell, Alaska, that was hauled by rail to Anchorage area asphalt plants.

➢ ***Please explain DOT&PF's seasonal weight restriction policy. What are the weight restrictions imposed in the Spring?***

In accordance with 17 AAC 25.100(a), the department may impose restrictions on any aspect of vehicle operation on any highway whenever the highway, in judgment of the commissioner, may be seriously damaged or destroyed by such operation. The restrictions shall be effective after due notice has been given to the public, except in an emergency requiring immediate action. The legal vehicle weight of a vehicle or combination of vehicles, including load and equipment, operated or moved on the state highway system is established in 17 AAC 25.013 and 17 AAC 25.335.

The department posts public notices to inform the public and the trucking industry when seasonal weight/load restrictions are to be imposed by the department on its highway system for all vehicles over 10,000 pounds gross vehicle weight (GVW). These weight restrictions are stated as a percentage of legal allowable weight and shall be applied to the maximum axle loading cited in 17 AAC 25.013(e). These annual restrictions are very dependent upon weather, local soil conditions and frost depth, but usually occur between March and June of each year. These restrictions can reduce the allowable gross vehicle weight by as much as 50%. When imposed, these restrictions are posted on the department's Division of Measurement Standards & Commercial Vehicle Enforcement webpage found at: http://www.dot.alaska.gov/mscve/index.cfm.

➢ ***Has DOT&PF used rubberized asphalt in any of its projects?***

Rubberized asphalt mixes have been used on department projects as follows:

- 2007 - Elmore Road: from Abbott to Tudor Road
- 2009 - East Dowling Road
- 2011 - Seward Hwy MP 115-124
- 2009 - *Glenn Hwy: from Hiland Road to Eklutna
- 2010 - *Glenn Hwy: from Airport Heights to Hiland Road; and from Eklutna to Parks Hwy Junction.
  *Scheduled for mill-and-fill resurfacing in 2017 with asphalt mix containing hard aggregate.

Rubberized asphalt mix was also used in Alaska in the 1980s. In the mid-1980s, rubberized asphalt mix (a proprietary product at that time, called PlusRide) was used in paving the A-C Couplet in Anchorage, and Airport Way in Fairbanks. The Anchorage mix lasted more than 30 years. Old timers report that the Fairbanks mix lasted two weeks and was replaced with conventional mix, after the occurrence of several accidents caused by the slick pavement surface. Workmanship and accurate proportion of ingredients that go into the mix are crucial for the longevity of the mix.

➢ ***Please provide information on DOT&PF's recent high-friction surface treatment efforts.***

Through a summer 2016 Federal Highway Safety Improvement Program (HSIP) project, Central Region placed high-friction surface treatment (HFST) at 28 locations (short application segments) in an area stretching from Wasilla, to Anchorage, to Soldotna. The 28 locations were chosen with the help of the Central Region Traffic Section, based on Central Region crash data analysis.

HFST is used to improve safety by increasing friction in critical areas such as: high accident areas, horizontal curves, high speed ramps, and bridge decks. HFST is placed on sound pavement (no cracking, rutting, or other distresses should be present). HFST is placed by applying a polymer resin binder on top of a dry pavement surface followed by spreading calcined bauxite aggregate topping. The total cost for the 28 sections was $4,060,100 for 147,640 square yards of HFST, i.e., $27.50/square yard.

If you or your committee members have further questions, please feel free to contact Mike Lesmann at (907)465-4772.

Sincerely,

Marc Luiken
Commissioner

Enclosures

Cc: Darwin Peterson, Legislative Director, Office of the Governor
Mike Lesmann, Legislative Liaison, DOT&PF

In the WA rutting photo, notice the ridges or bulges at the edges of the wheel paths. The asphalt mix is being consolidated and displaced laterally. This type of rutting is called plastic flow or deformation, due to heavy trucks (notice the dual-tire imprint in each wheel path), typically occurring during hot summer months when the mix is soft.

The Anchorage photo shows rutting as depression in the wheel path without any ridges or bulges at the edges of wheel path ruts. That is indicative of abrasive rutting, i.e. removal/dislodging of material from the wheel path.

The majority of the rutting seen on southcentral and southeastern Alaska highways is due to studded tire abrasive wear. Some plastic deformation is seen at intersections where trucks stop and/or turn (e.g. Old Seward and O'Malley intersection, where trucks from the adjacent industrial areas take the intersection to reach the Seward Hwy).

State of Alaska
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Central Materials Laboratory

Bituminous Mix Design Pre2009 Sample Data

State Num 58545 Federal Nu F-M-0551(2) QUALITY
Name Eagle River Loop to Hiland Rd Ph. II Field Nu MD-2 Lab Num 1991A-1927
Sampl Type IIA HAP Mix Design Item Num 401(1) Source Quality Asphalt
Sampled From Stockpiles MLF Date Sample 08/22/1991

Sieve	%Pass	Spec
3/4" / 19.0	100	100
1/2" / 12.5	90	83-97
3/8" / 9.5	78	71-85
#4 / 4.75	53	46-60
#8 / 2.36		
#10 / 2.00	30	24-36
#16 / 1.18		
#30 / .600		
#40 / .425	15	11-19
#50 / .300		
#80 / .210	9	5-13
#100 / .150		
#200 / .075	7	4-10

Method
Frac 1 Face 70 min
Frac 2 Face
Frac All
Flat Elong
Flat 1:3
Flat 1:5
PI 4
FA Angularit

Bulk 2.667 Agg SpG 2.768
Effective

Asph Type MAPCO AC-5
Asph Opt 5.5 5.0-6.0
Asph SpG

Optimum Determination
% Asphalt 5.7 @ % Voids 4.0

Report Remarks

Method	ATM T-17		Quality Num 1991A-1155
Blend	25:00:75:00: :		Quality Num
Blows	75 GYR		Quality Num
Rice			
VF	74		
VTM	4.6	3-5	
VMA	14.7	14.0+	
VCA			
Stability	2260	1500+	
Flow	12	8-16	
Unit Wt	150.3		
RUT			

Anti-Strip Pavebond Special Required 0.25
Mixing Temp 290
CompactionTemp 180
Dust/Asphalt Ratio Specification F
Dust/Asphalt Ratio by Effective %AC No

AC	UW	Stab	Flow	VTM	VF	VMA
4.5	148.1	2290	13	7.6	58	15
5	149.5	2270	13	5.9	67	14.7
5.5	150.3	2250	12	4.7	74	14.7
6	150.9	2300	12	3.5	80	14.8
6.5	150.3	2210	13	3.1	83	15.5

Nuke Mass Calibration
Gauge
A1
A2
A3
Background