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Use of Superpave Specifications for Airport Pavements

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so necessary.

Why use Superpave?

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- Asphalt cement has been PG graded since about 1995 – soon it may not be possible to get CGSB Pen-Vis graded cement
- Superpave aggregate gradations are prevent from Ontario eastward and are starting to be used in the western Provinces
- Likely to be more cost effective to use readily available material

FAA concerns regarding highway HMA specifications for airfields

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- FAA expects HMA to meet quality and performance standard of FAA 's P-401
  - Airfield's greater sensitivity to FOD and environmental distresses
  - Long proven track record with P-401
- No motivation for airfield consultants to request a Modification of Standard to deviate from P-401 in the US

History Lesson - The Marshall Method

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- Developed by Bruce Marshall in late 1930's for Mississippi Highway Department
- Further modified in 1943 for WWII
- Adopted as typical design method in 1949
- Worked well as a design method into the 1980's
- Problems
  - Wheel loading began to increase
  - Traffic on roads began to increase

- Are we seeing similar loading issues on airfield pavements?

Superpave

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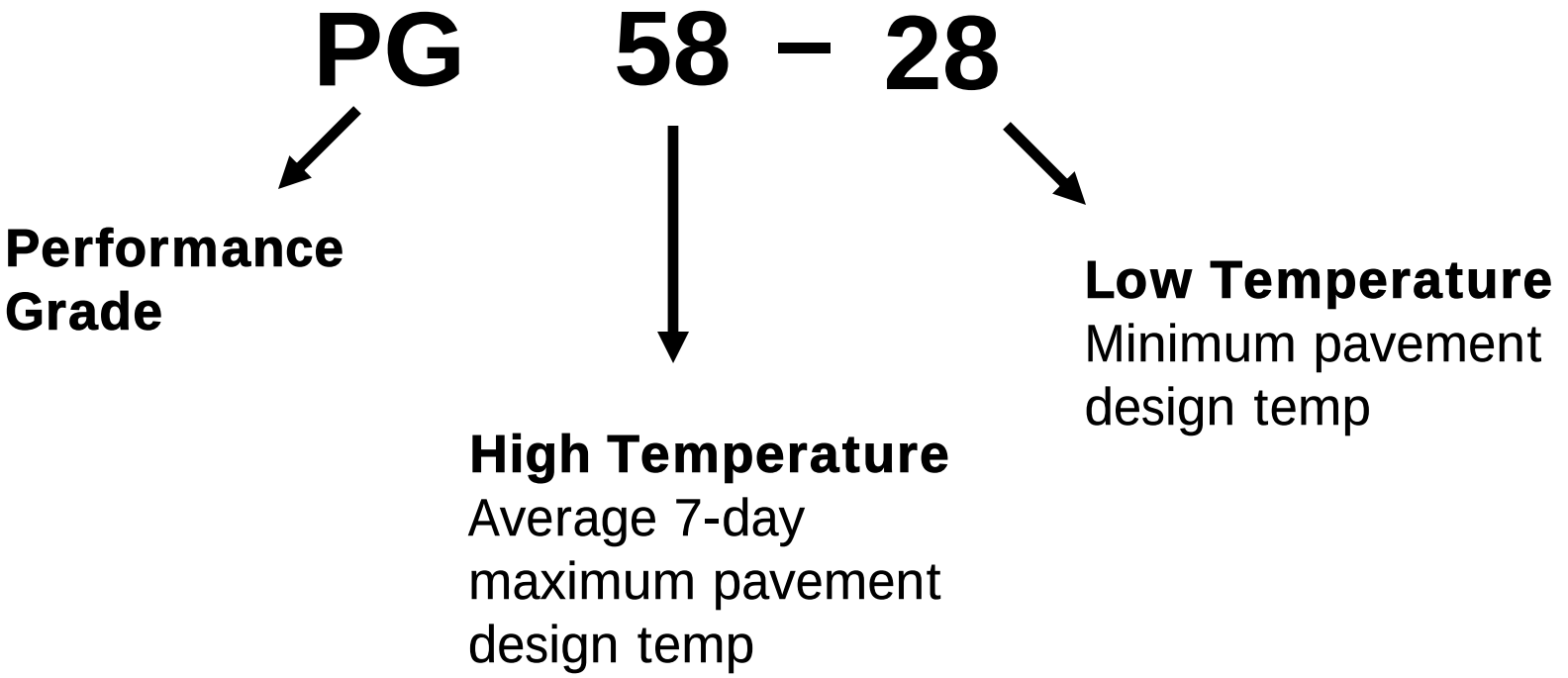
- Developed in response to pressures on the US highway system
- Strategic Highway Research Program (SHRP), authorized by Congress in 1987
- A highly focused, $150 million, 5-year effort designed to improve the performance of highway materials and highway maintenance practices with 2 subsequent extensions
- Adopted by all states within a few years (funded)
- Administered by “Lead State” teams

PG Grading System



LTPPBIND Software

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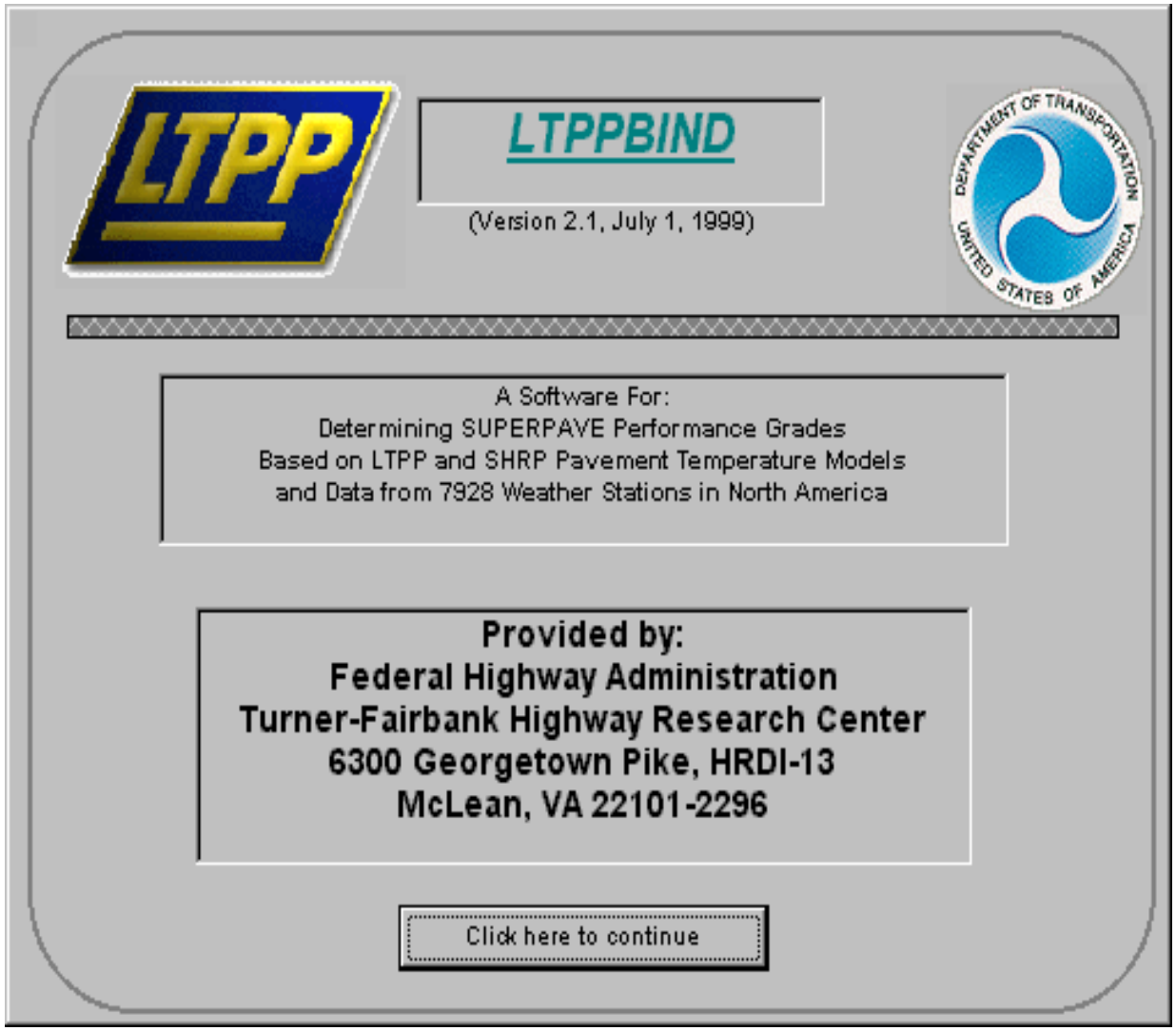
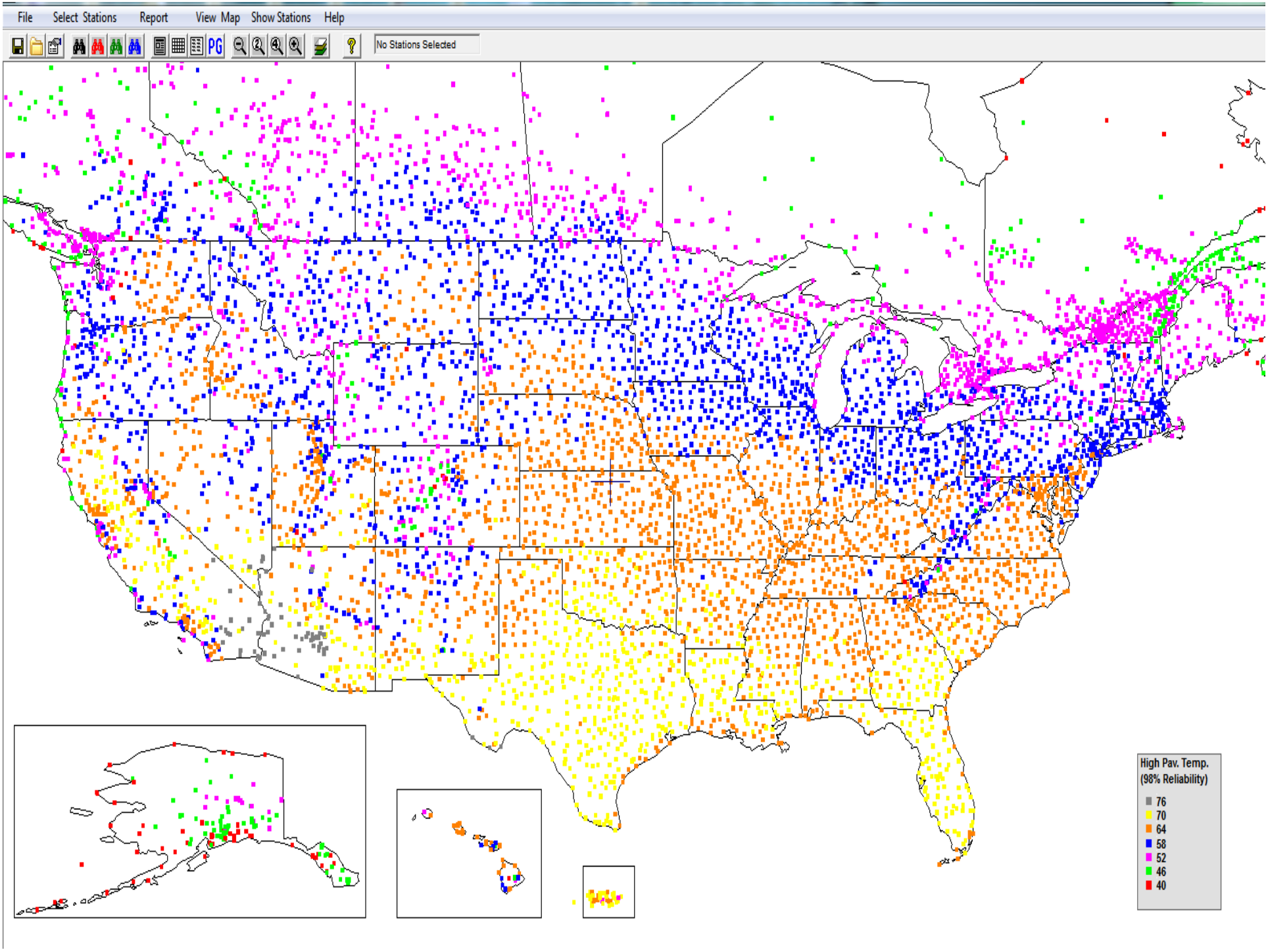


http://www.fhwa.dot.gov/pavement/ltpp/bind/dwnload.cfm

so necessary.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(98% Reliability)
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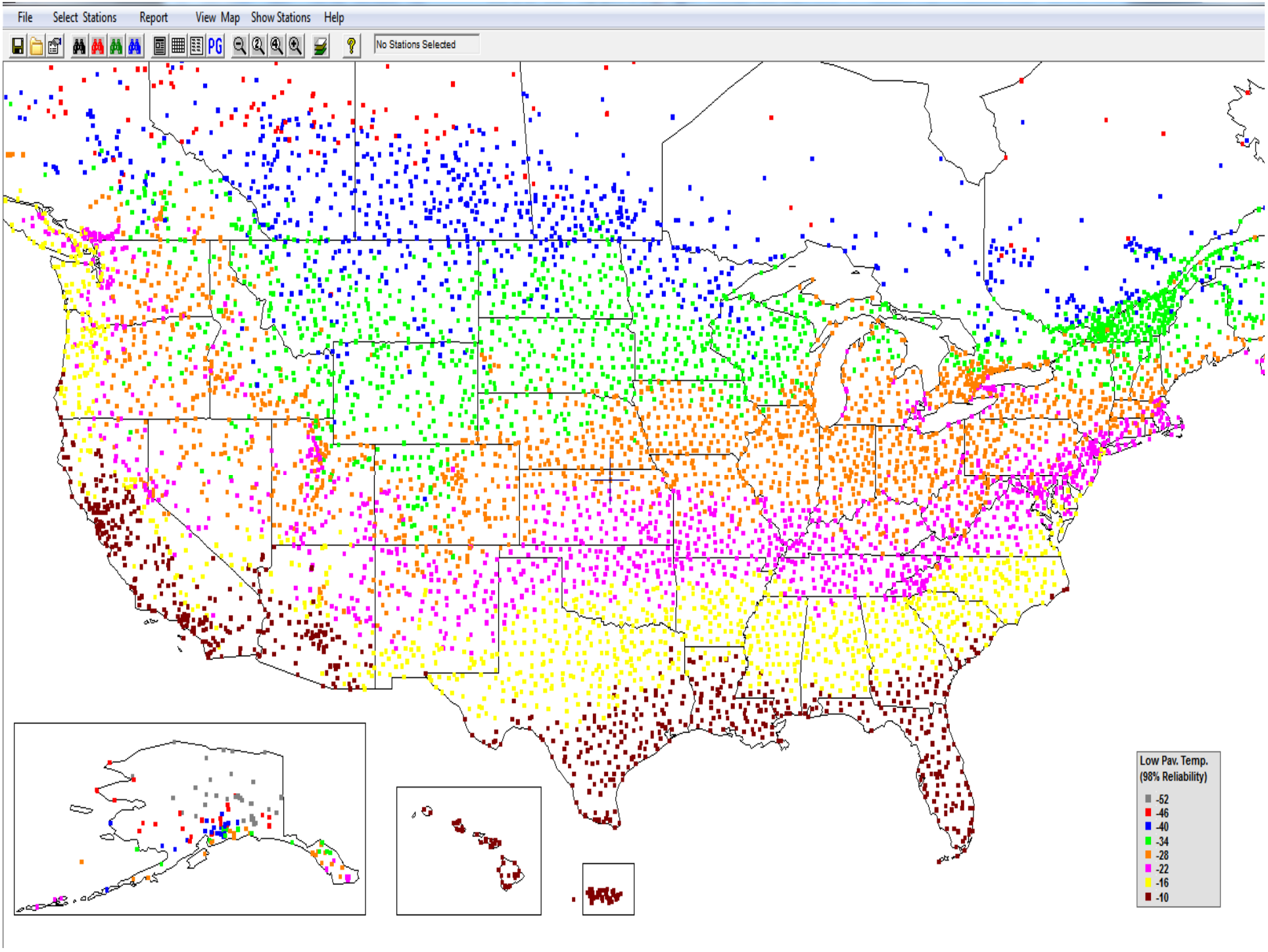
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(98% Reliability)
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-22
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-10

Typical Superpave Mixes

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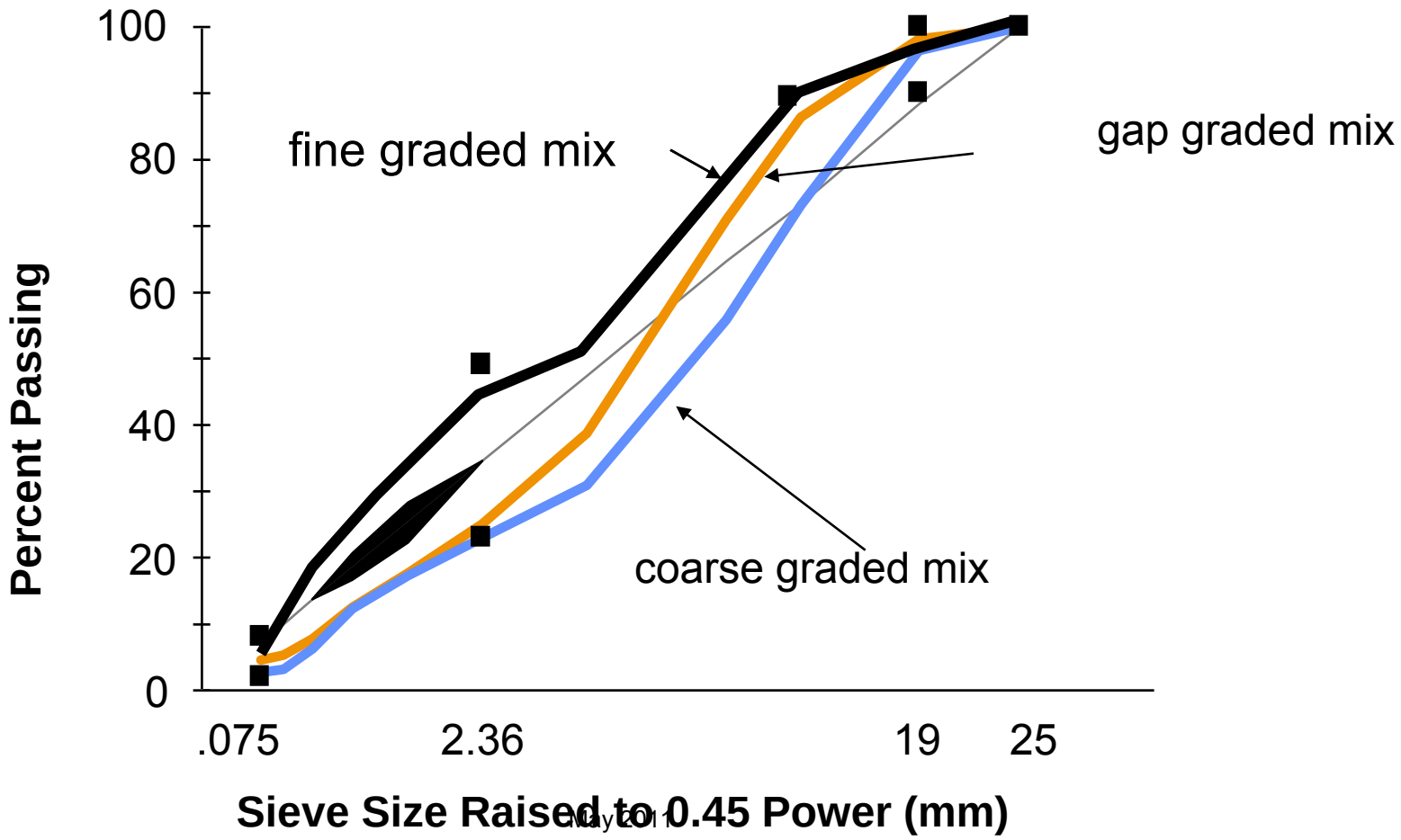

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Superpave vs. Marshall

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Airfield Asphalt Pavement Technology Program (AAPTP)

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- FAA sponsored Research program carried out at Auburn University
- Several research reports on using Superpave highway specifications for airport work
- Program was suspended in 2010 but reports still online
- Webinars and Reports still available online
- www.aaptp.us

AAPTP Projects

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- Many very interesting research reports
- Three dealt with Superpave
  - 04-02: *PGAC for Airfield Pavements*
  - 04-03: *Superpave Mix Design for Airfield Pavements*
  - 06-05: *Guidelines for Use of Highway Specs for HMA Airport Pavements*
- Full reports available on line
  - www.aaptp.us

Item P-401 [Superpave] Engineering Brief No. 59A

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- Item P-401 Plant Mix Bituminous Pavement (Superpave) dated May 12, 2006
  - Interim Guidance Specification
  - Use in Constructing
    - All Pavements: Runway, Taxiway, and Apron
  - Considered a Modification of Standards
    - Approval at FAA Reg. Office Level [<100,000#]
    - Approval at FAA HQ/AAS-100 Level [≥100,000#]

Superpave Specifications Adopted

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- Interim document was modified and adopted for use
- AC 150/5370-10E dated Sept 30, 2009
- Item P-401 (SP) approved for all runways and taxiways
- Allows for the use of Superpave specification without special approval
- No more barriers in the way of use of Superpave specification

Grade Bumping P-401

Aircraft Gross Weight (pounds)	High Temperature Adjustment to Base Binder Grade	
	Pavement Type	
	Runway	Taxiway/Apron
Less than 12,500	--	--
Less than 60,000	--	1
Less than 100,000	--	1
Greater than 100,000	1	2

NOTES:

1. PG grades above a –22 on the low end (e.g. 64–16) are not recommended. Limited experience has shown this to be a poor performer.
2. PG grades below a 64 on the high end (e.g. 58-22) are not recommended. These binders often provide tender tendencies.
3. PG grades above a 76 on the high end (e.g. 82-22) are not recommended. These binders are very stiff and difficult to work and compact.

Grade Bumping P-401 (SP)

Determine binder requirements from the LTTP Bind software using 98 percent reliability with no traffic or speed adjustments. Increase the high temperature grade by the number of grade equivalents indicated (1 grade is equivalent to 6 degrees C) below. Use the low temperature grade as determined from LTTP Bind. (see NOTES)

Aircraft Gross Weight (pounds)	High Temperature Adjustment to Binder Grade
	All Pavement Types
weight < 12,500	--
12.500 < weight < 100,000	1
weight > 100,000	2

NOTE: PG grades above a –22 on the low end (e.g. 64–16) are not recommended. Limited experience has shown an increase in block cracking with -16 or -10 grade asphalts.

Definitions to Remember

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- NMAS = One sieve size larger than the first sieve to retain more than 10 percent.

- MAS = One sieve size larger than the nominal maximum size.

P-401 Gradation

MAS

AGGREGATE - BITUMINOUS PAVEMENTS				
Sieve Size	Percentage by Weight Passing Sieves			
	1-½" max	1" max	¾ " max	½" max
1-½ in. (37.5 mm)	100	--	--	--
1 in. (24.0 mm)	86-98	100	--	--
¾ in. (19.0 mm)	68-93	76-98	100	--
½ in. (12.5 mm)	57-81	66-86	79-99	100
⅜ in. (9.5 mm)	49-69	57-77	68-88	79-99
No. 4 (4.75 mm)	34-54	40-60	48-68	58-78
No. 8 (2.36 mm)	22-42	26-46	33-53	39-59
No. 16 (1.18 mm)	13-33	17-37	20-40	26-46
No. 30 (0.600 mm)	8-24	11-27	14-30	19-35
No. 50 (0.300 mm)	6-18	7-19	9-21	12-24
No. 100 (0.150 mm)	4-12	6-16	6-16	7-17
No. 200 (0.075 mm)	3-6	3-6	3-6	3-6
Asphalt percent: Stone or gravel Slag	 4.5-7.0 5.0-7.5	 4.5-7.0 5.0-7.5	 5.0-7.5 6.5-9.5	 5.5-8.0 7.0-10.5

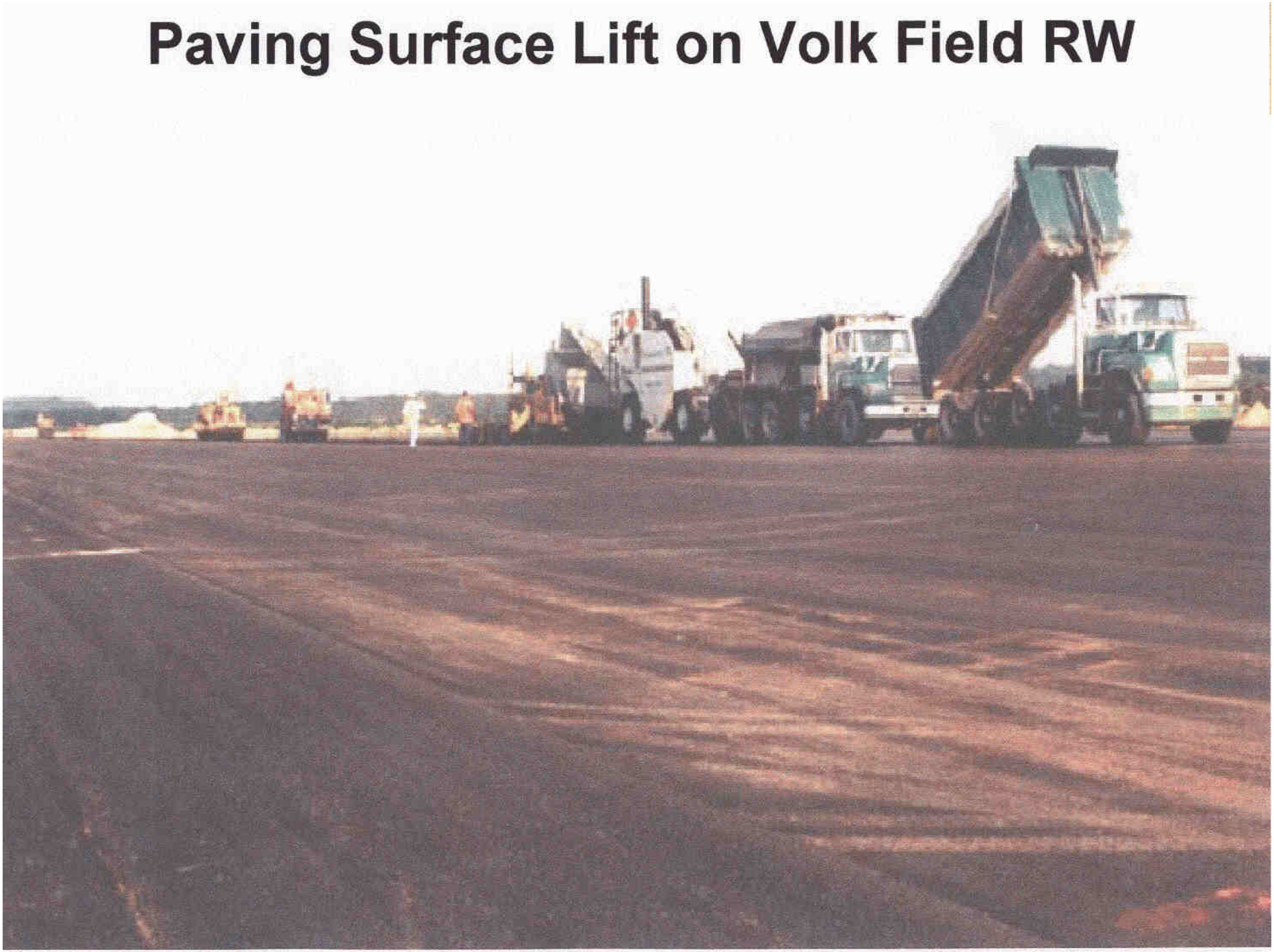
P-401(SP) Gradation

NMAS

AGGREGATE—BITUMINOUS PAVEMENTS

	Runway Pavements		Taxiway and Apron Pavements			
	¾-inch (19 mm)Nominal Maximum Size Aggregate	½-inch (12.5 mm) Nominal Maximum Size Aggregate	¾-inch (19 mm)Nominal Maximum Size Aggregate		½-inch (12.5 mm) Nominal Maximum Size Aggregate	
Sieve Size	Gradation Limits	Gradation Limits	Gradation Control Points Percent Passing by Weight		Gradation Control Points Percent Passing by Weight	
			Min.	Max.	Min.	Max.
1 in. (25.4 mm)	100	100	100	100		
¾ in. (19.0 mm)	76-98	100	90	100	100	100
½ in. (12.5 mm)	66-86	79-99		90	90	100
3/8 in. (9.5 mm)	57-77	68-88				90
No. 4 (4.75 mm)	40-60	48-68				
No. 8 (2.36 mm)	26-46	33-53	23	49	28	58
No. 16 (1.18 mm)	17-37	20-40				
No. 30 (0.60 mm)	11-27	14-30				
No. 50 (0.30 mm)	7-19	9-21				
No. 100 (0.15 mm)	6-16	6-16				
No. 200 (0.075 mm)	3-6	3-6	2	8	2	10
Asphalt Cement Content (%)	4.5-7.0	5.0-7.5	4.5	7.0	5.0	7.5

Paving Surface Lift on Volk Field RW




Surface grooves after one year


Surface groves after four summers
and three winters of snow plows

AI Regional Engineer Offices and User Producer Groups

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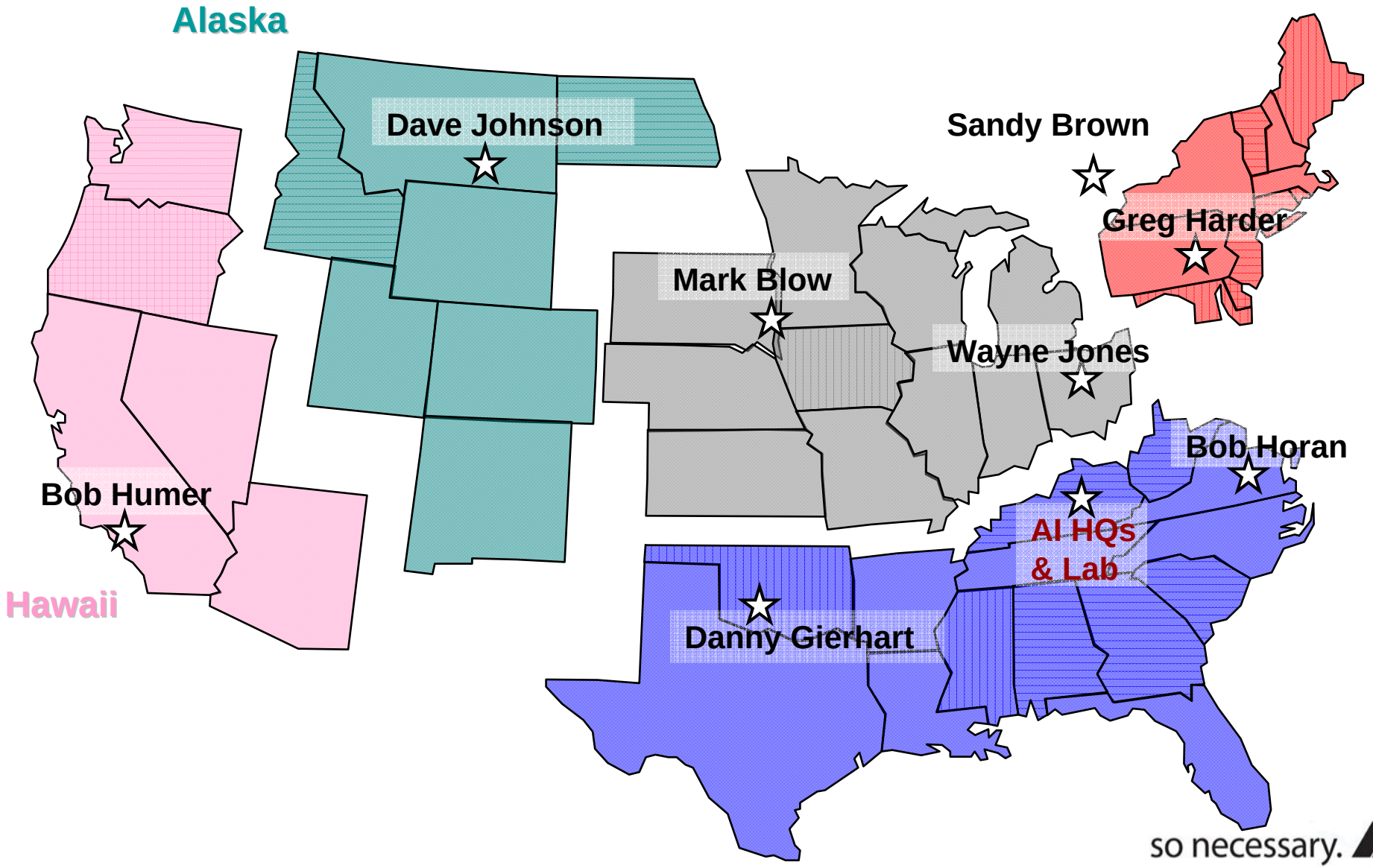

so necessary.

Mixture Design Considerations for Airport Pavements

A Fast Overview!

Thank You!