


Virginia's Approach to Superpave



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Thoughts on Ndesign

- Higher Ndesign tends to produce a “stronger” aggregate skeleton
- As Ndesign increases, VMA decreases for the same aggregate gradation
- The SGC produces a constant strain in a confined steel mold - field compaction is constant stress
- If a gradation continues to meet minimum VMA, AC% decreases as Ndes increases



Performance of VDOT's early Superpave test sections

Laboratory Air Voids

Project	SGC Gyrations	SGC Avg. VTM %	50-Blow Avg. VTM %	Diff. %
Route 7	134/86	1.5	4.1	2.6
I-66	152/96	1.6	4.3	2.2
Route 29	152/96	1.4	2.2	0.8

Field Air Voids

Project	Construction		After 3+ Years	
	Avg. %	Std.	Avg. %	Std.
Route 7	10.5	2.23	8.4	2.04
I-66	8.3	0.87	6.1	1.38
Route 29	6.9	0.37	4.8	1.34

Rut Depths after Three+ Years

Project	Average, mm	Standard Deviation
Route 7	1.9	1.02
I-66	2.4	0.56
Route 29	3.3	1.77

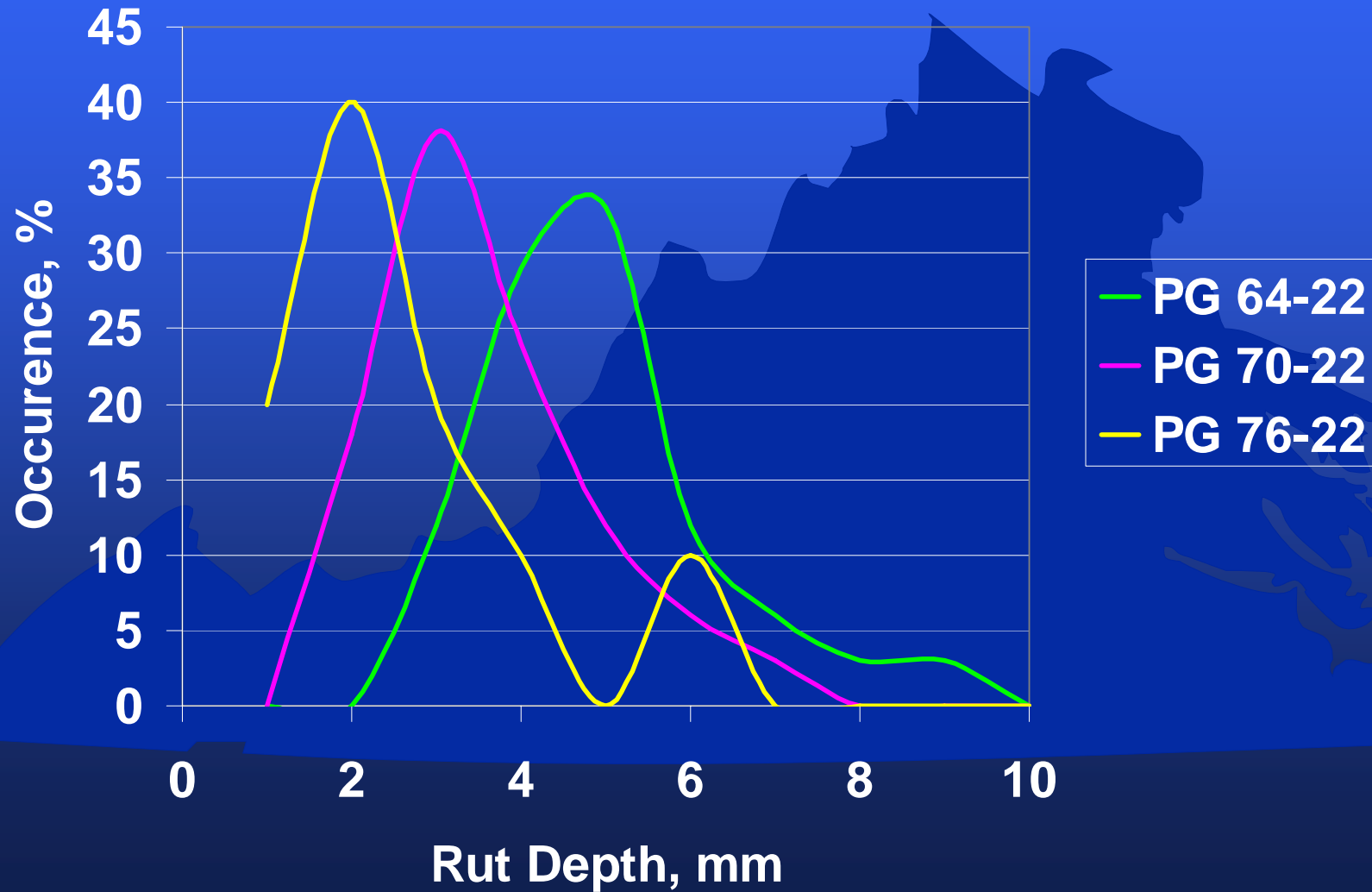
Note: 1/8 in = 3.2 mm

All Route 7 data collected in first 6 samples, high SGC air voids = 2.0%

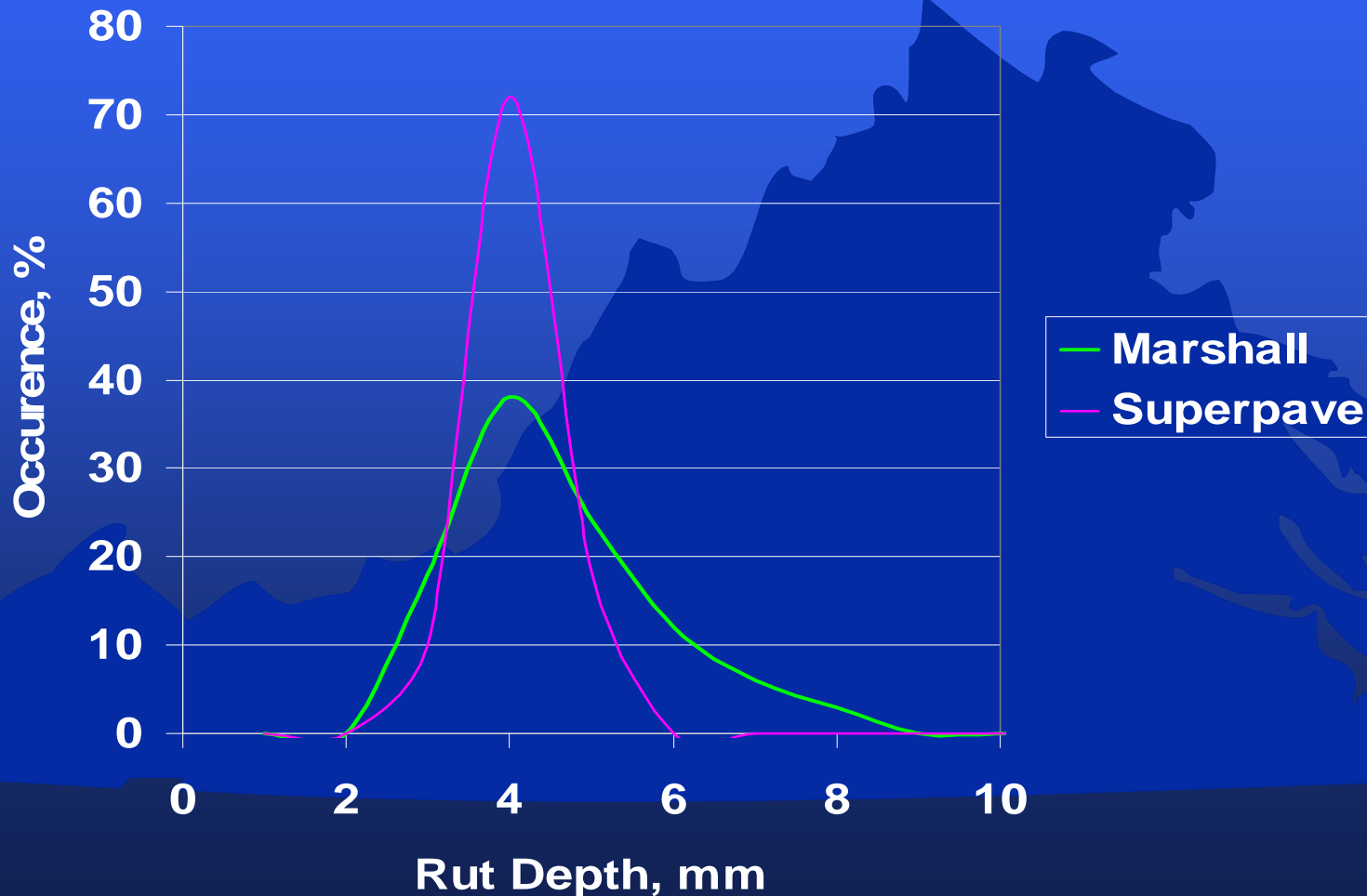
Implementation of PG Binders

- VDOT implemented PG Binders with Marshall mixes in 1997
- Constant 50-blow compaction level
- Binder grade increased with increasing traffic volume and/or decreasing traffic speed
 - < 3 million ESALs = PG 64-22
 - 3-10 million ESALs = PG 70-22
 - > 10 million ESALs = PG 76-22

'97-'98 50-Blow Marshall Surface Mixes



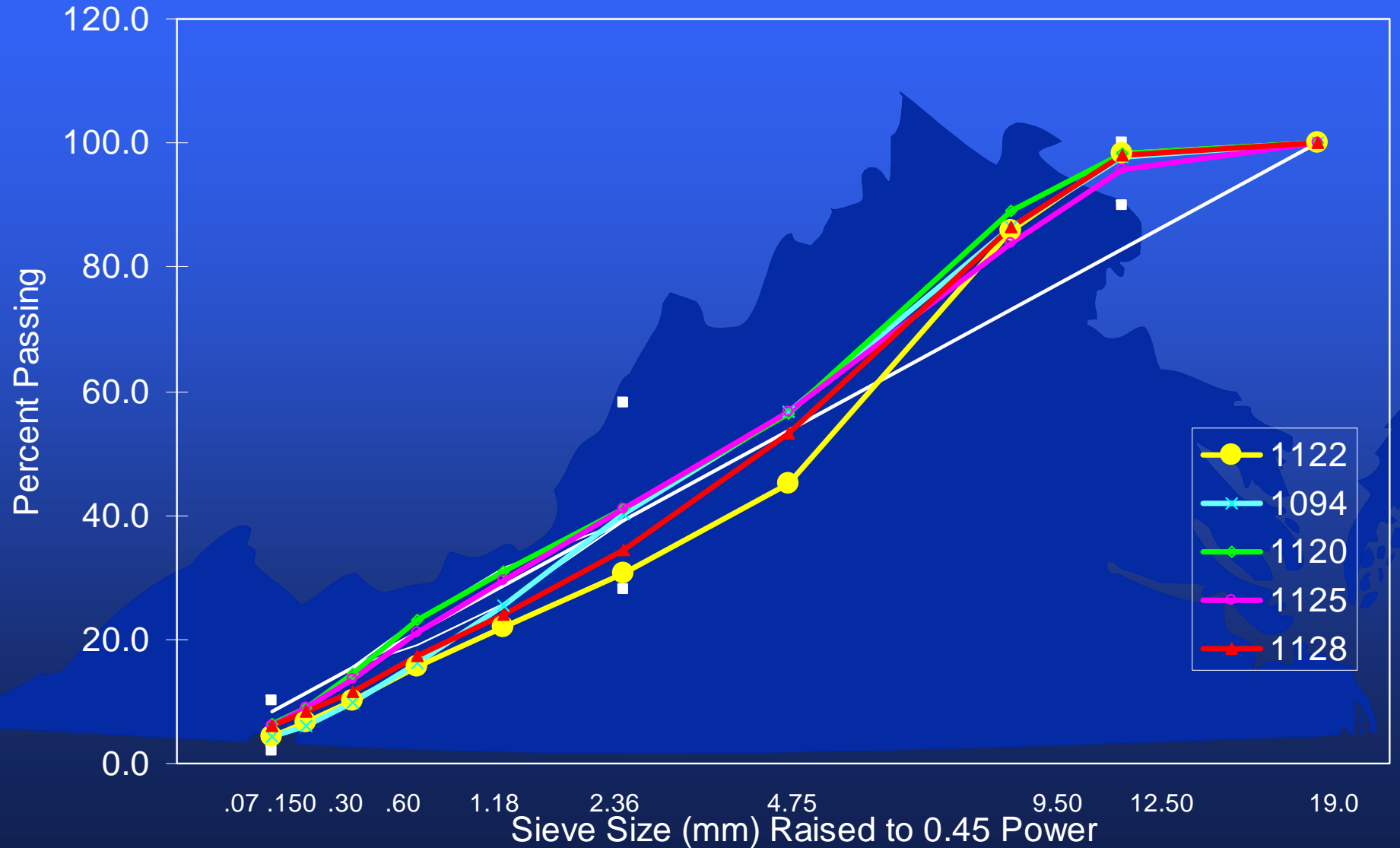
Comparison of Marshall and Superpave PG 70-22 Surface Mixes



Investigation of Proposed N_{design} Table

- VTRC sampled 10 mixes in 3-10 million ESAL range
- Pairs of samples compacted to 152/96, 100 and 75 gyrations
- Compared volumetrics and predicted AC% for 4% VTM using Superpave estimation

12.5 mm Nominal Sieve Size



Comparison 152/96 to New Gyration

Gyrations

100

75

VMA

-.33

+.37

AC%

-.14

+.16



VDOT's 2001 N_{design} Table

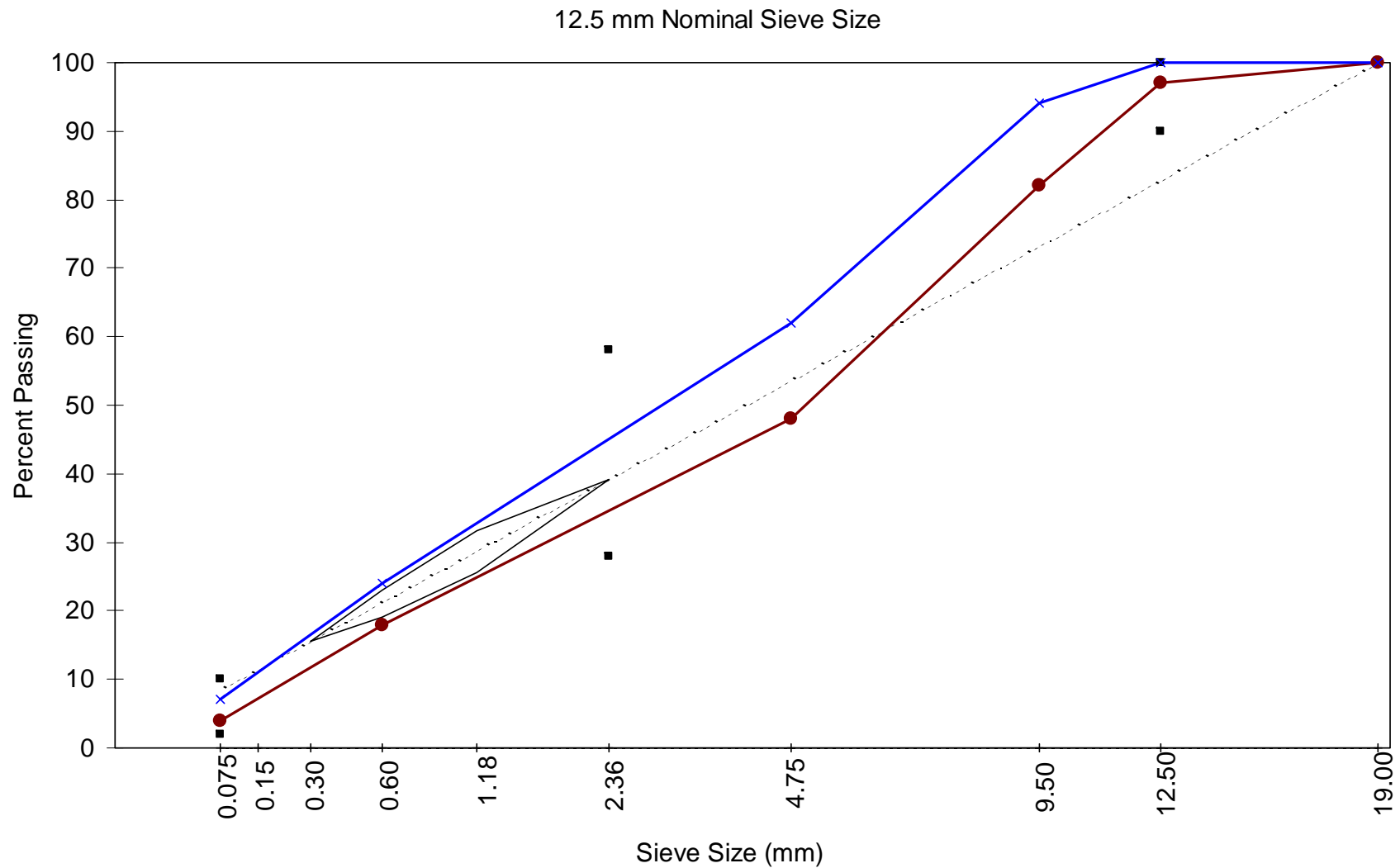
Traffic Million ESALs	PG Binder	N_{design}
<3	64-22	65
3-10	70-22	65
>10	76-22	65

Typically do not use 20 year design life

Why???

- More asphalt = greater durability
- More asphalt and “not as harsh” (or coarse) mix = improved field compaction
- Better compaction = lower permeability
- Binder stiffness = rut resistance

12.5 mm NMAS Marshall Gradation Limits



New Gradation Control Points for #8 (2.36 mm) Sieve

NMAS	Lower (Coarse) Control Point
9.5	38
12.5	34
19.0	28
25.0	Gradation plots above MDL on sieves coarser than #30