

# Superpave 5

Harold Hill



## ➤ Superpave 5 Concept

- Mix Design 5% air voids
- Field Compaction 95% Gmm
- Higher design air voids 5% instead of 4%
- No change in asphalt content
- Improve Durability
- Lower air voids in the field



## Purdue Experiment

- Three mix designs
- 9.5-mm (3-10 million)
- 9.5-mm (10-30 million)
- 19.0-mm (10-30 million)

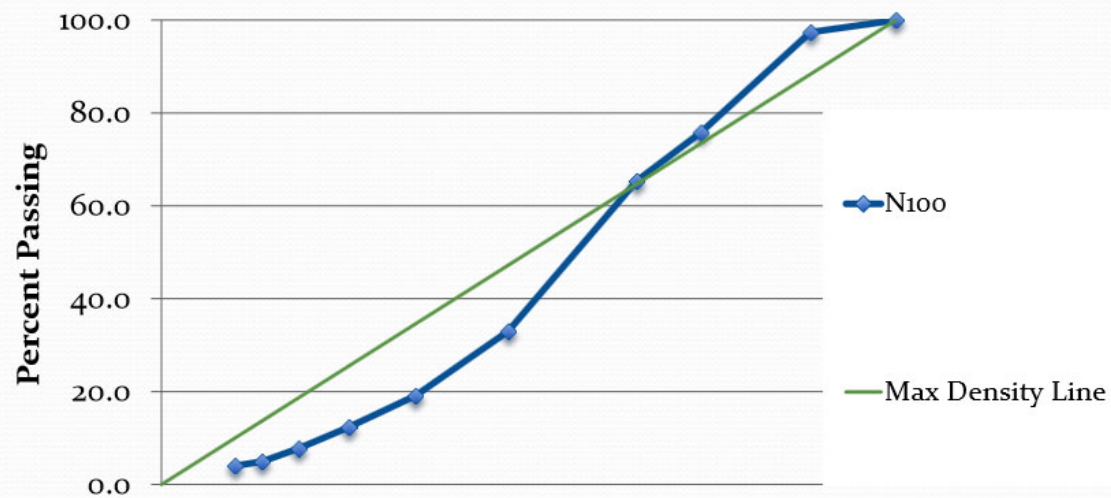


## 9.5-mm Mixture Design

	Trial Number			
	N100/4	N70/5	N50/5	N30/5
$P_b$ , %	5.9	5.9	6.0	6.0
$P_{be}$ , %	4.7	4.7	4.7	4.7
$V_a$ , %	4.1	5.1	4.9	5.3
VMA, %	15.0	16.0	15.8	16.3
VFA, %	72.3	67.9	68.9	67.7



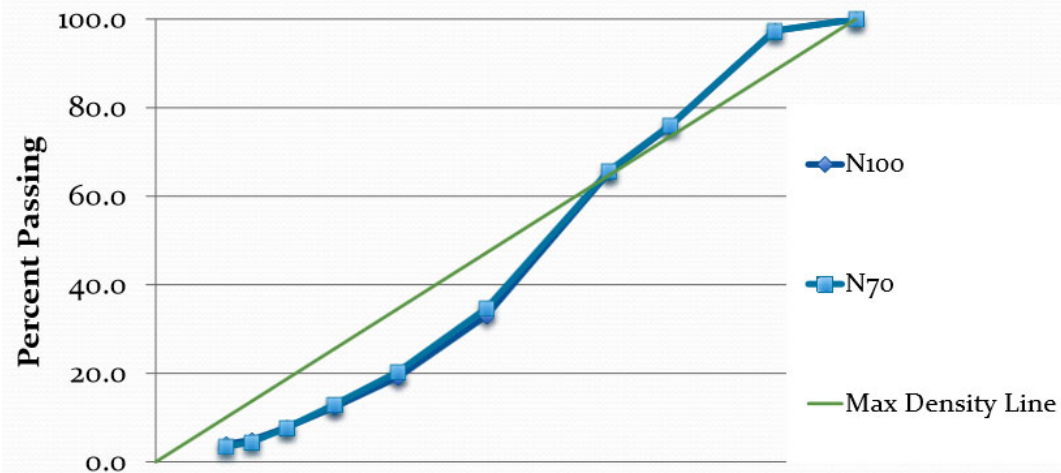
## 9.5-mm Mixture Gradations



Sieve Size raised to 0.45 power, mm



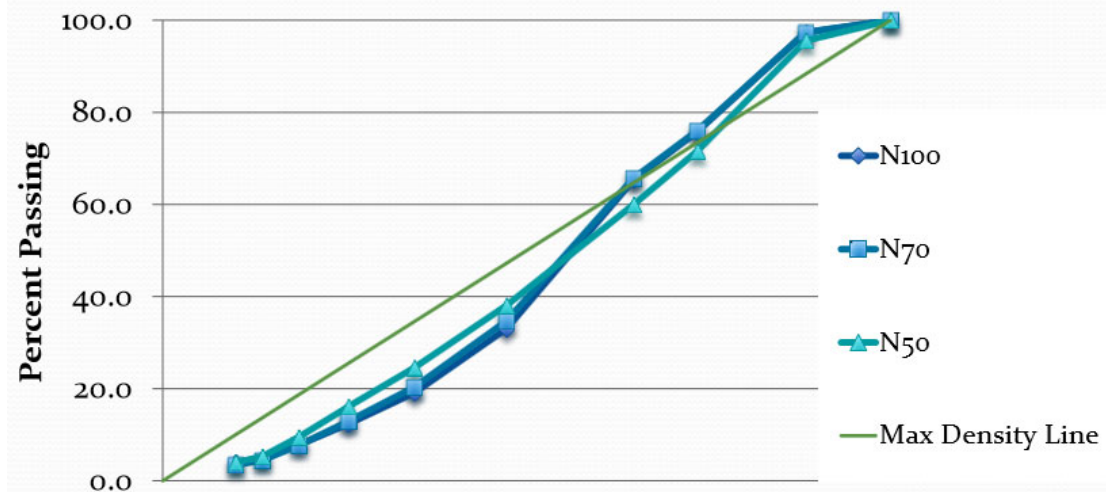
## 9.5-mm Mixture Gradations



Sieve Size raised to 0.45 power, mm



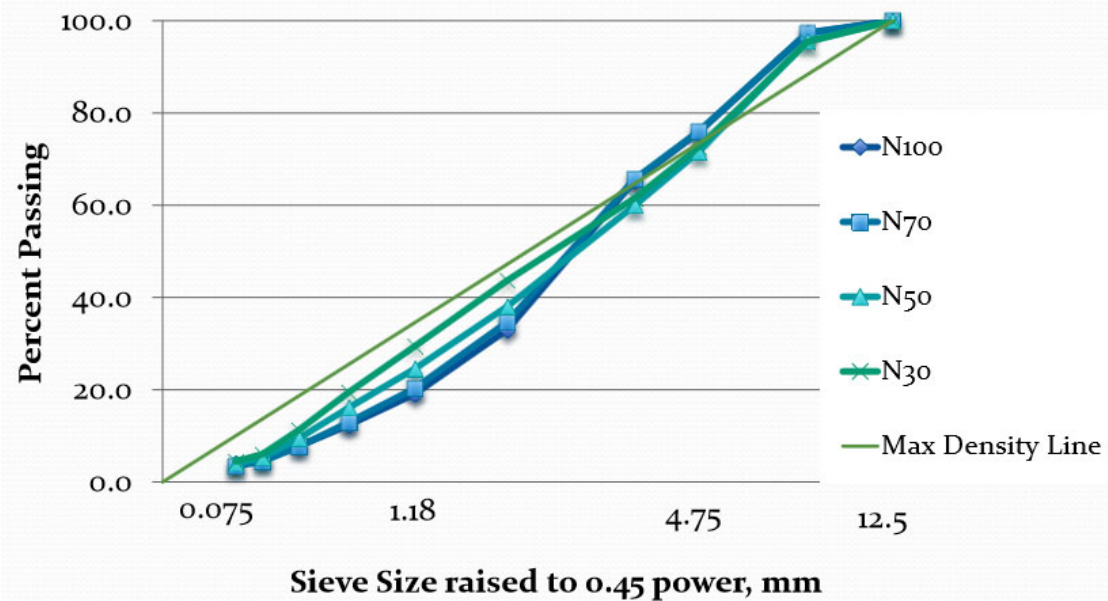
# 9.5-mm Mixture Gradations



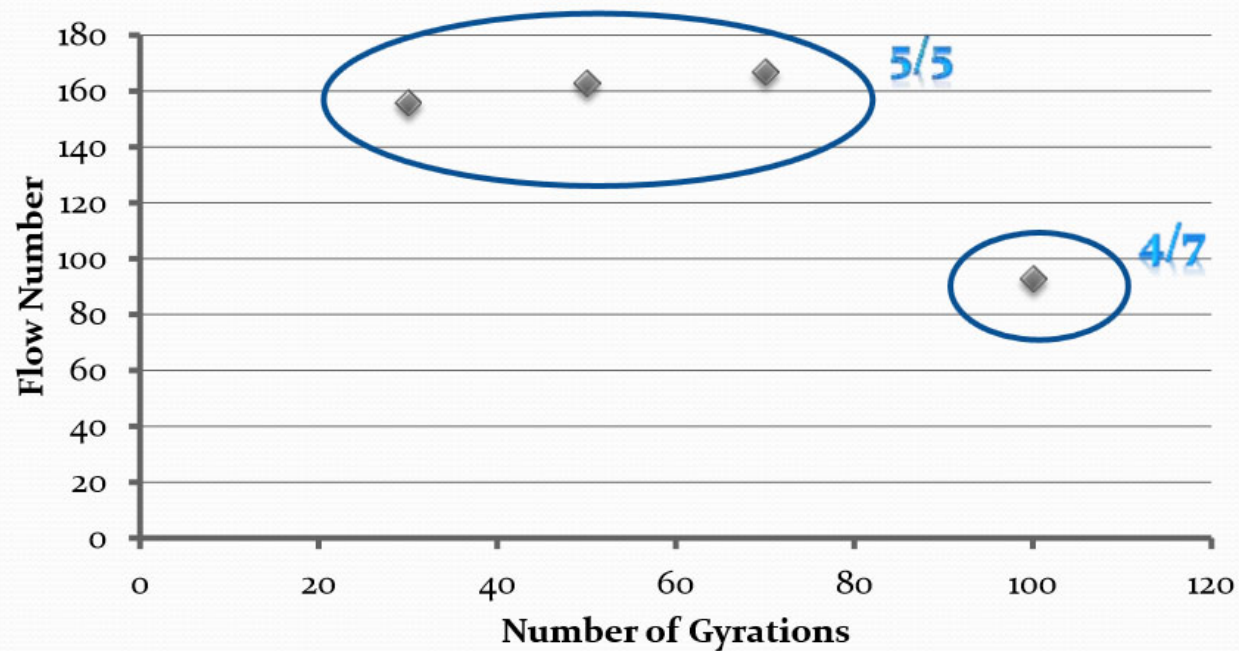
Sieve Size raised to 0.45 power, mm



## 9.5-mm Mixture Gradations



# Rut Resistance Comparison



**pennsylvania**  
DEPARTMENT OF TRANSPORTATION

# Laboratory Study Conclusions

- Designs at 5% Air Voids  
And 95% Gmm Compaction

30 gyrations

- Equal or Greater
  - Stiffness
  - Flow Number

- Than designs at 4% Air Voids  
And 93% Gmm Compaction

100 gyrations



## Paving Train



## Paving Train









N30 (5% Air Void) Mix





Field Density Control





N30 (5% Air Void) Mix





Plate Sample from Road for QA



## Gradation (Plate Sample)

	Superpave5 (20141213)			Superpave4 (20141212)	
	DMF	Sublot 1	Sublot 2	DMF	Sublot 1
25.0	100.0	100.0	100.0	100.0	100.0
19.0	95.2	97.9	97.7	95.3	98.2
12.5	80.5	84.5	91.4	82.1	86.3
9.5	68.8	73.8	82.5	73.0	76.2
4.75	42.1	48.0	54.7	47.0	51.6
2.36	30.1	33.7	37.9	32.6	35.3
1.18	20.6	22.8	25.5	20.8	22.6
0.600	14.5	15.9	17.6	13.9	15.3
0.300	9.5	10.4	11.2	9.4	10.0
0.150	6.8	7.1	7.8	6.9	7.0
0.075	5.8	5.3	6.0	5.7	5.4



## QA Volumetric Properties

	Superpave5			Superpave4	
	DMF	Sublot 1	Sublot 2	DMF	Sublot 1
% Asphalt	4.8	4.44	4.76	4.6	4.68
Gmm		2.505	2.494		2.523
Gmb 1		2.366	2.368		2.411
Gmb 2		2.358	2.365		2.411
Air Voids 1	5.0	5.5	5.1	4.0	4.4
Air Voids 2	5.0	5.9	5.2	4.0	4.4
VMA 1	15.1	14.4	14.6	13.4	12.9
VMA 2	15.1	14.6	14.7	13.4	12.9



# QA Core Density

	Superpave5			Superpave4	
	DMF	Sublot 1	Sublot 2	DMF	Sublot 1
Gmm		2.513	2.496		2.521
Core Gmb 1		2.423	2.360		2.352
Core Gmb 2		2.419	2.418		2.333
Ave % Gmm		96.3	95.7		92.9



## Works Cited

All information came from National Asphalt Pavement Association (NAPA) at:

[https://www.asphaltpavement.org/PDFs/Engineering\\_ETGs/Mix\\_201504/23%20Huber%20Optimizing%20Laboratory%20Design%20for%20Five%20Percent%20Superpave.pdf](https://www.asphaltpavement.org/PDFs/Engineering_ETGs/Mix_201504/23%20Huber%20Optimizing%20Laboratory%20Design%20for%20Five%20Percent%20Superpave.pdf)

