



The Impact of Micro Bauxite Powder and Nano Bauxite Powder On the mechanical properties of asphalt mixture



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Outlines

- Introduction
- Asphalt modifiers & Problems
- Materials and Methods
- Weather Simulatio
- Results Discussion
- Conclusion

Introduction



Asphalt modifiers & Problems



SBS (styrene-butadiene-styrene)



Nano Silica



ASA (Acrylonitrile Styrene Acrylate)

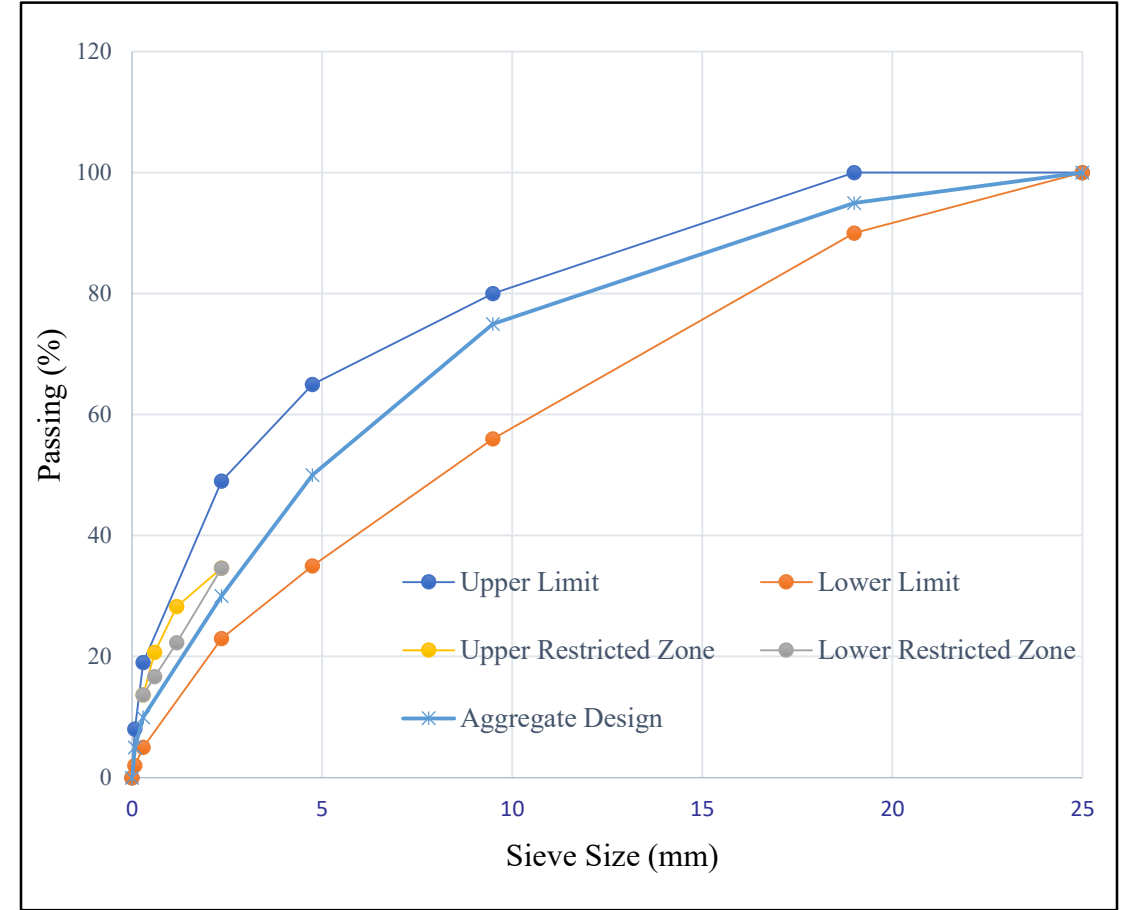


Nanoclay

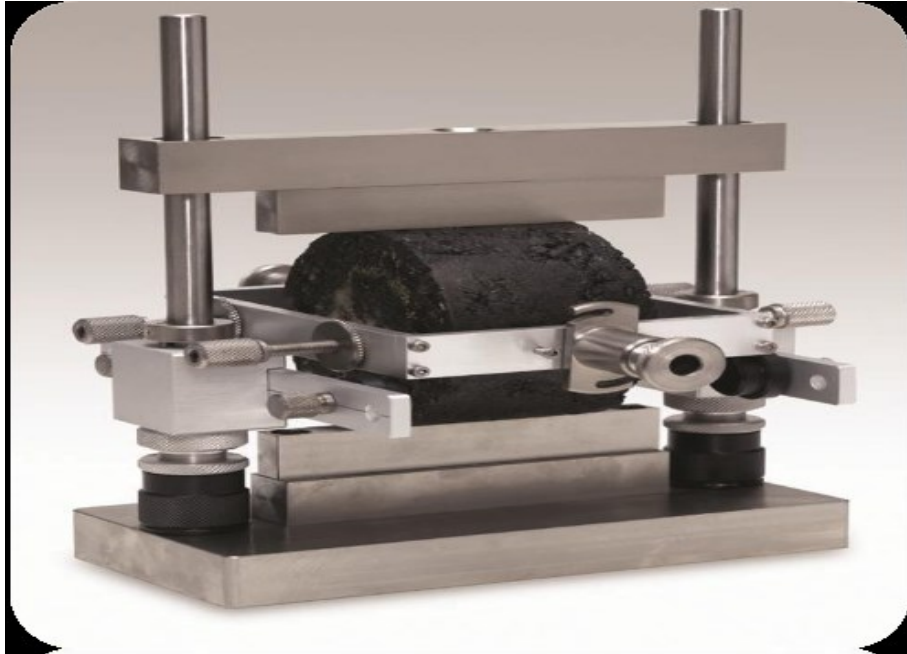
Materials and Methods



80/100
Penetration
grade



Materials and Methods



Parameter	Condition
Temperature (°C)	25 and 40
Loading pulse width (ms)	100
Pulse repetition period (ms)	1000
Applied load at 25 °C	10% of the indirect tensile strength (500 N)
Applied load at 40 °C	10% of the indirect tensile strength (300 N)



Parameter	Condition
Temperature (°C)	40
Loading pulse width (ms)	100
Applied load (KPa)	100
Termination	After 10000 $\mu\epsilon$ or 3600 cycles

Weather Simulation



Short Term Aging



Mixing Period

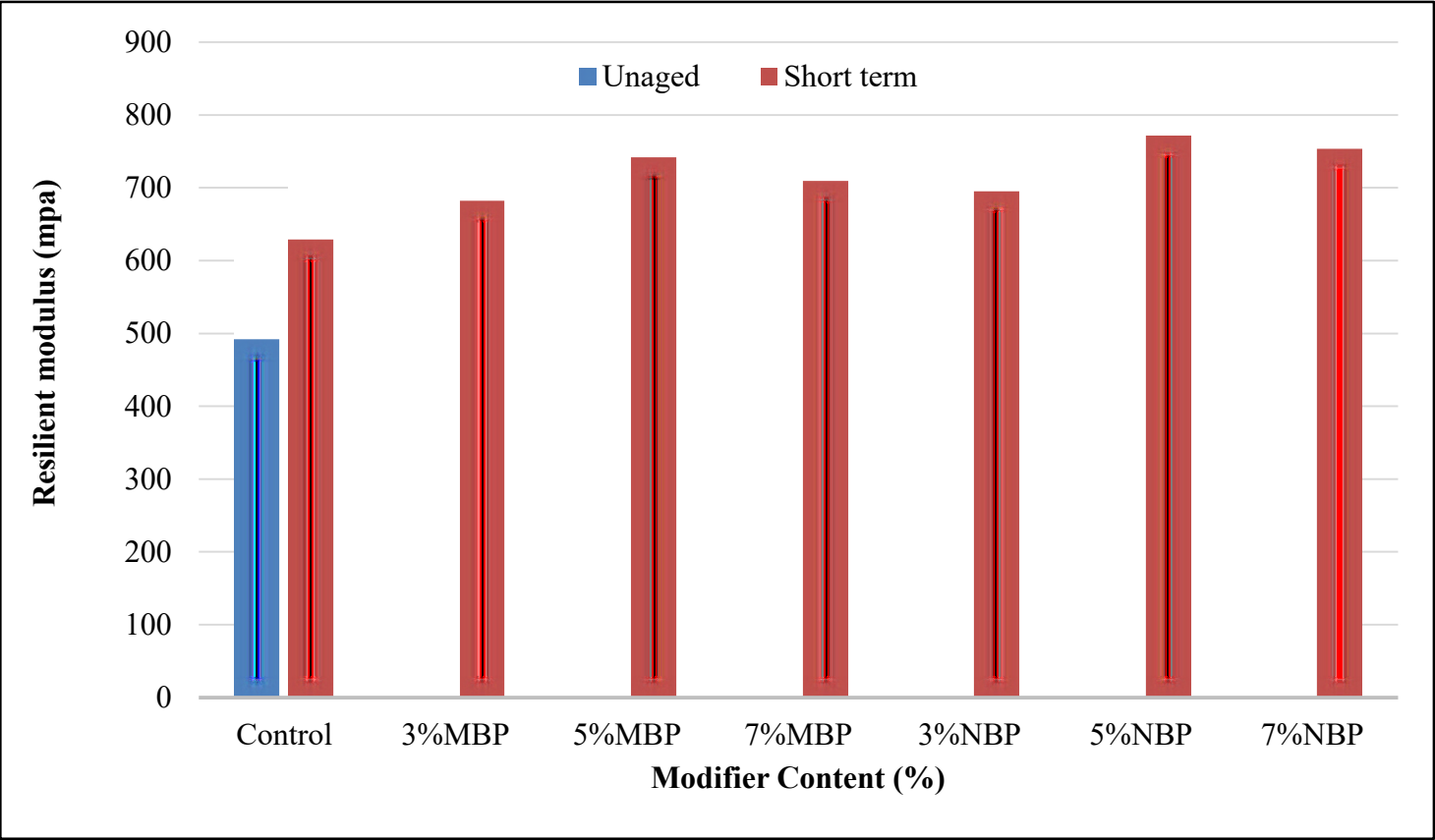


Transport Period



Construction Period

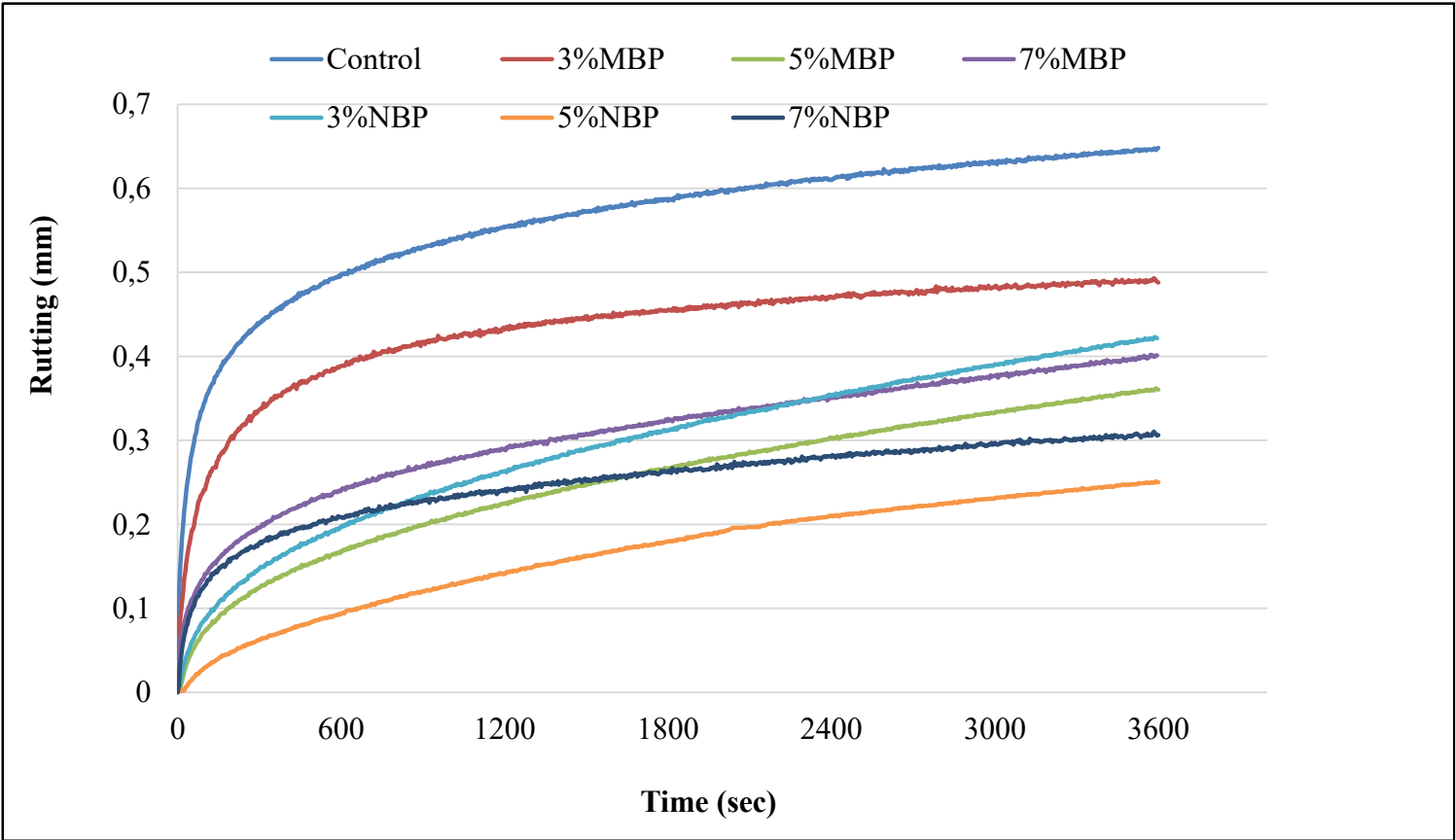
Resilient modulus



Aging index of the resilient modulus 40 °C

Percentages (%)	Unaged	RTFO	Aging Index
			RTFO/Unaged
Control	491	629	1.28106
3% MBP	558	682	1.22222
5% MBP	618	741	1.19903
7% MBP	579	709	1.22453
3% NBP	562	695	1.23665
5% NBP	653	771	1.1807
7% NBP	631	753	1.19334

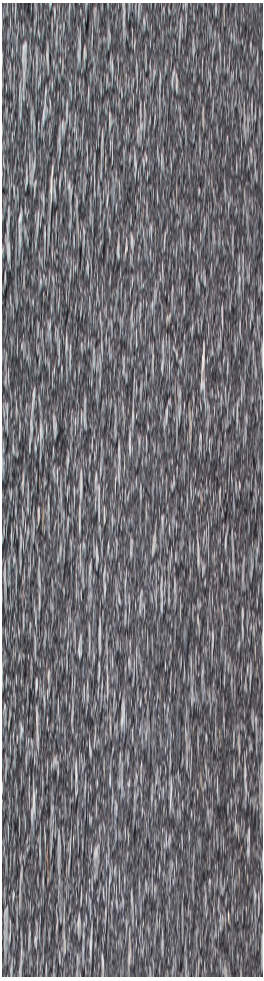
Dynamic Creep



Aging index of the dynamic creep

Percentages (%)	Unaged	RTFO	Aging Index
			RTFO/Unaged
Control	0.65	0.46	0.71
3% MBP	0.49	0.32	0.66
5% MBP	0.36	0.22	0.61
7% MBP	0.40	0.26	0.64
3% NBP	0.42	0.29	0.68
5% NBP	0.25	0.14	0.54
7% NBP	0.31	0.18	0.58

Conclusion

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- ✓ it was found that the asphalt mixtures modified with MBP and NBP consistently exhibited higher resilient modulus values than the base asphalt mixtures and 5% for both modifiers had the highest value.
 - ✓ The improvement in resilient modulus at 25 °C for 5% MBP and 5% NBP is 22.10 % and 31.29 % while the enhancement for both concentration at 40 °C is 25.86% and 33% respectively
 - ✓ For the dynamic creep results show that by adding 5% MBP and 5% NBP, the rutting resistance increased for 44.35% and 61.39% respectively compared to the base asphalt mixture.

