VERMONT
AGENCY OF TRANSPORTATION
RESEARCH PROGRAM

Performance Structural Concrete Optimized for Cost, Durability and Manufacturability

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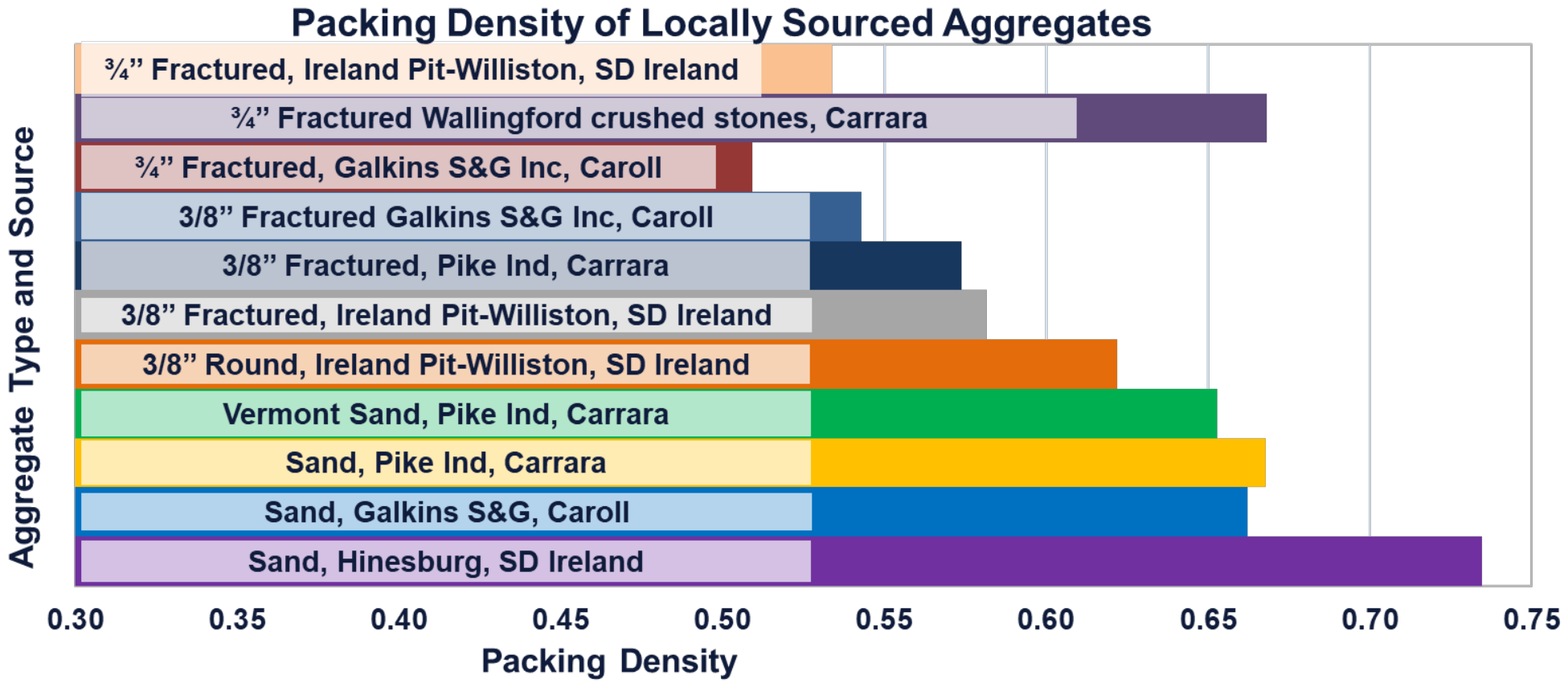
Introduction

- A high-quality, durable concrete is crucial to reducing carbon emissions and lowering replacement costs.
- The project is funded by the Transportation Infrastructure Durability Center (TIDC) at the University of Maine.
- Bismark Yeboah, the main researcher who worked on the project, graduated this summer.
- The project focuses on developing concrete mixes using the packing density approach with locally sourced aggregates.

Vermont Benefits of the Project

- The use of environmentally friendly green concrete mixes can enhance the sustainability of concrete in Vermont.
- This improved durability reduces both maintenance and replacement costs.
- These mixes can be easily adopted by regional concrete producers in Vermont and across New England.
- By incorporating different types of cementitious materials, producers have greater flexibility in selecting the most suitable options.

Methodology



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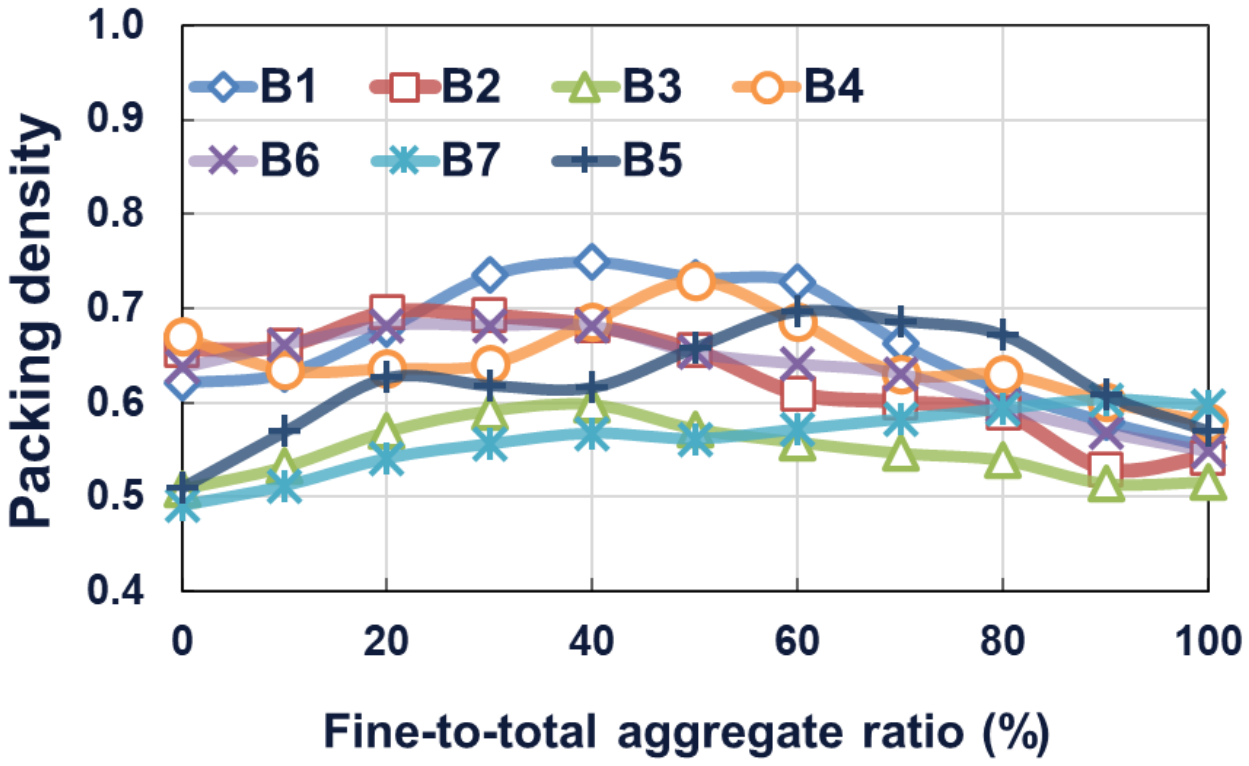
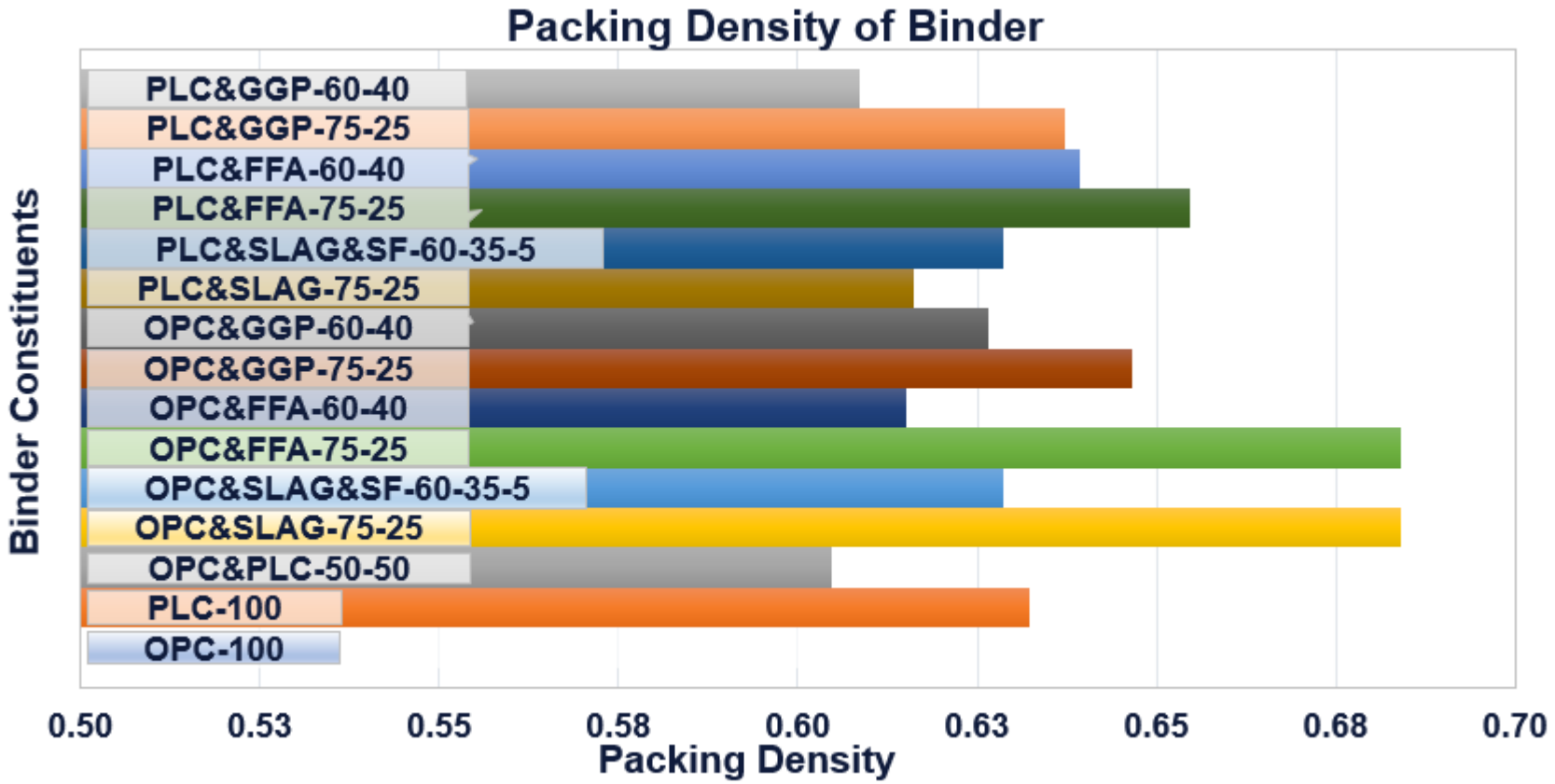
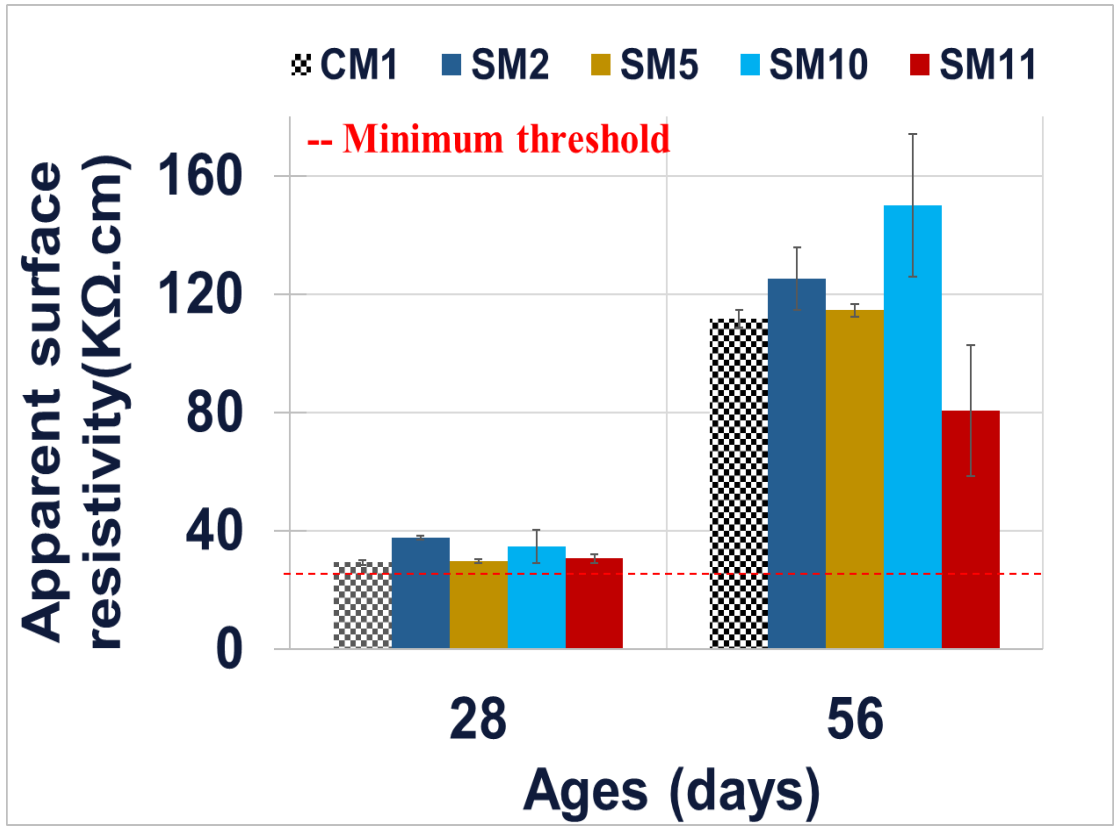


	Aggregate 1	Aggregate 2
B1	3/4'' stones, SD Ireland	Sand, SD Ireland
B2	3/4" stones, Carrara	Vermont Sand, Carrara
B3	3/4'' Stones, Caroll	Sand, Galkins
B4	¾" Stones, Carrara	3/8" Stones SD Ireland
B5	3/8" Stones, Carrarra	3/4'' Stones, Carroll
B6	¾'' Stones, Carrara	Sand, Carrara
B7	¾'' Stones, Caroll	3/8'' R. stones, SD Ireland

Methodology



Results



SM2: PLC&GGP-75-25

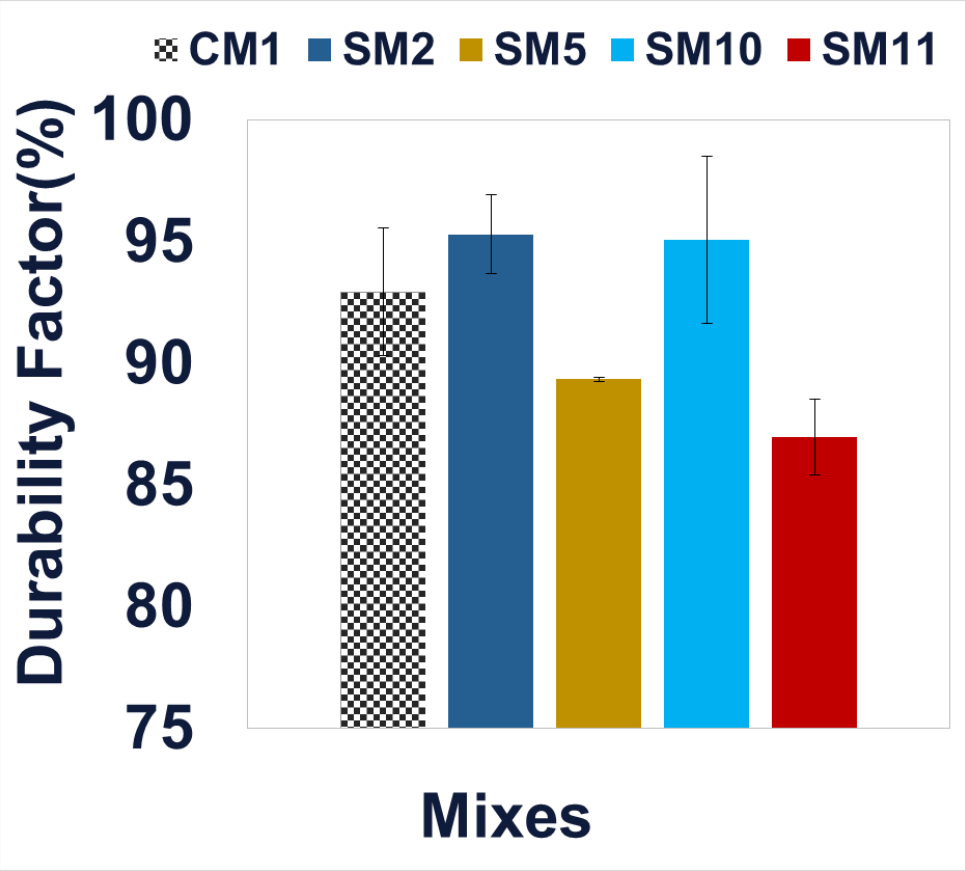
SM5: PLC&FFA-75-25

SM10: PLC&SLAG-75-25

SM11: PLC&SLAG-75-25

CM1: Tercem

Results



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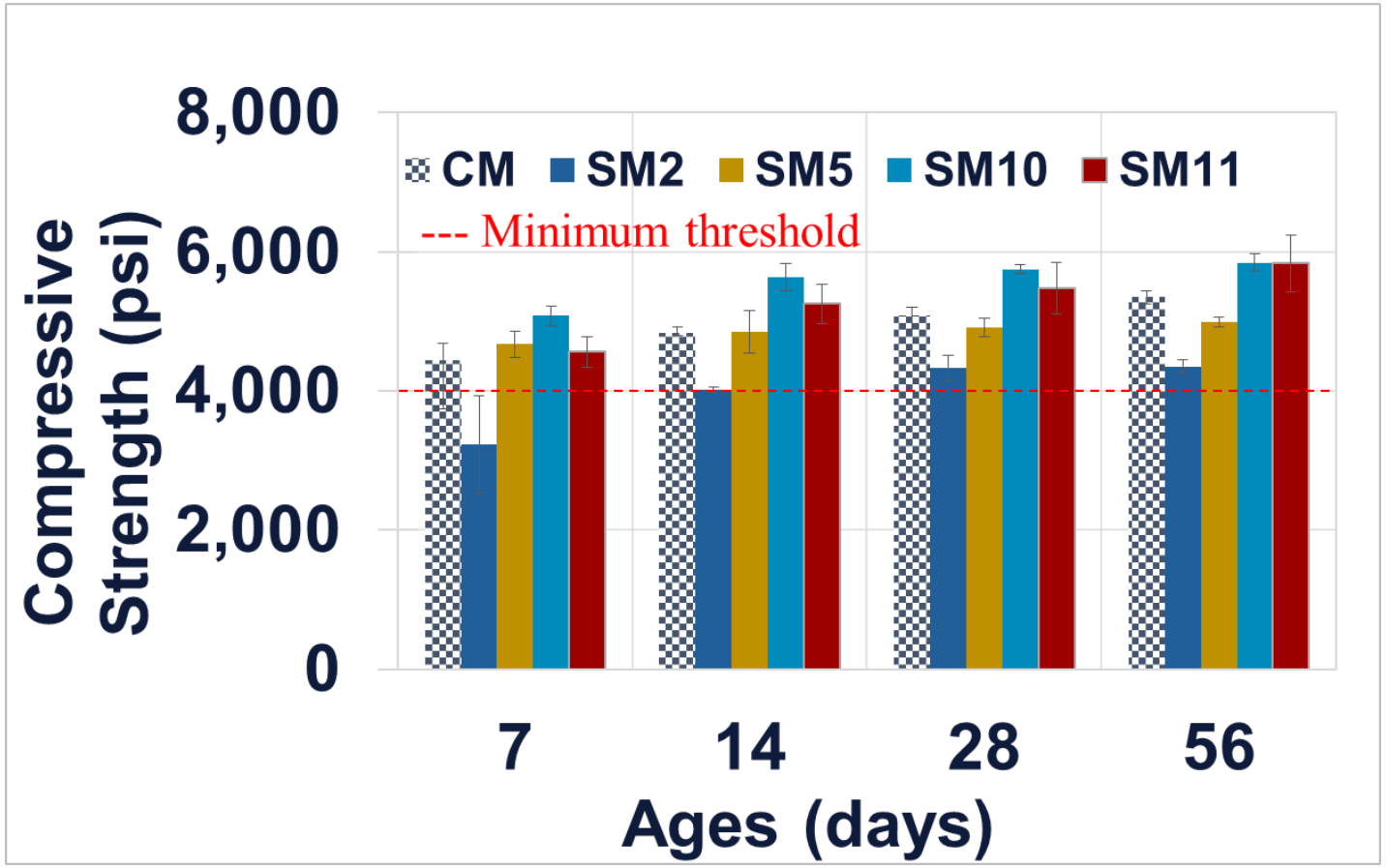

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Results

Rank	28th Day compressive strength (psi) Min: 4,000	Relative dynamic modulus (%) Min: 60	Durability factor (%) Min: 60	Surface resistivity (KΩ.cm) Min: 22	Max. 28th Day drying shrinkage (%) PCD: 0.032 PCS: 0.042
1	SM10 (5,845)	SM10 (95)	SM10 (95)	SM10 (149.95)	SM10 (0.027)
2	SM11 (5,833)	SM2 (95)	SM2 (95)	SM2 (125.06)	SM2 (0.030)
3	SM5 (4,995)	SM5 (89)	SM5 (89)	SM5 (114.43)	SM11 (0.032)
4	SM2 (4,354)	SM11 (87)	SM11 (87)	SM11 (80.48)	SM5 (0.034)

Acknowledgements

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